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**REPORT**  
**OF THE**  
**PROCEEDINGS OF THE CONGRESS**





H. M. King ALPHONSO XIII  
Patron of the Congress

KAVLAK  
MADRID

PERMANENT INTERNATIONAL ASSOCIATION  
OF ROAD CONGRESSES

1, Avenue d'Iéna, PARIS

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IV<sup>th</sup> INTERNATIONAL ROAD CONGRESS

SEVILLE 1923

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REPORT

OF THE

PROCEEDINGS OF THE CONGRESS

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RENNES—PARIS  
IMPRIMERIES OBERTHUR

1924



# PREFACE

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On June 2, 1921, the delegates of the Spanish Government on the Permanent International Commission of Road Congress sent the Executive Bureau of that Association an invitation to assemble the Fourth International Road Congress at Seville. This invitation having been unanimously and enthusiastically accepted by the Permanent International Commission at its meeting on June 11, 1921, energetic steps were immediately taken for the creation of the local Organization Commission. The composition of this Commission will be found in these "Proceedings"; let it suffice here simply to recall that the President was Sr. D. A. VALENCIANO y MAZERES, Ingeniero Jefe de Caminos, Canales y Puertos, Sub-Director de Obras publicas del Ministerio de Fomento, Madrid, Member of the Permanent International Commission and that the General Secretary was Sr. D. Luis PRORA, Jefe de Administracion del Ministerio de Fomento at Madrid, and that the said Commission included the most experienced technical experts and administrators in Spain.

At its meeting on June 11, 1921, the Permanent International Commission discussed and drew up the programme of subjects to be dealt with at the Fourth Congress, with the exception of two subjects, the choice of which it reserved for the local Organization Commission. This Commission, which was created towards the end of the year 1921 has not ceased to work with energy and has succeeded in overcoming all difficulties, in bringing its difficult task to a conclusion and in earning the thanks of all those who took part in the Congress. The Commission, first of all, undertook a most effective propaganda. In agreement with the Executive Bureau and with its cooperation, it published in

the three languages accepted for the Congress, the *first circular*, dated April 29, 1922, which stated :—

1. The approximate date of the opening of the Fourth Congress, the conditions of admission, either as a member of the Permanent International Association or as a simple adherent of the Fourth Congress;
2. The composition of the Committee of Patrons and of the local Organizing Committee for the Fourth Congress;
3. The Rules of the Permanent International Association of Road Congresses which constitute the General Rules applicable to every Congress;
4. The special Rules for the Fourth Congress, amplifying the above-mentioned General Rules on certain points;
5. The Programme of Questions asked.

After agreement between the Executive Bureau and the local Commission, the final programme of the subjects to be submitted to the Fourth Congress was drawn up and, on June 23, 1921, the Executive Bureau asked the first delegate of each Government affiliated to the Association to be good enough to arrange for the nomination of Rapporteurs for his country. For nations not yet affiliated to our Association at that time, and, in particular, for the United States, Canada, etc., the Executive Bureau approached the members of the Association who were best qualified and the technical experts who were best known in those countries.

156 Rapporteurs, belonging to 13 different nationalities, accepted the task proposed to them of submitting, either individually or in collaboration, a report for the Fourth Congress. The number of Reports thus promised amounted to 59 but, as six Rapporteurs subsequently retired or failed to submit their reports in time, this number was reduced to 53, namely : 50 on the six Questions appearing on the Programme and 3 on the Communication. Adding the general Reports to each of the six Questions, we arrive at the total of 59 reports submitted to the Congress.





✠ KAVLAK  
MADRID

Exmo Sr D. Antonio VALENCIANO  
General President of the Congress

Some of these reports, in spite of the most pressing requests, did not reach the General Secretariat until the end of November 1922, that is to say, less the six months before the meeting of the Congress. In addition, as the Rapporteurs généraux were appointed somewhat late, they only received the last translations of the individual reports during February 1923; so that the Executive Bureau desires to express its appreciation of the energy which they showed in their work. However, it was impossible to distribute the General Reports at the same time as the individual reports and a second dispatch, containing the General Reports, had to be made subsequently. Nevertheless, the publications were sent off before the meeting to all members of the Permanent International Association and also to temporary members, whose names were communicated to the Executive Bureau before April 30, 1923. A copy of the General Reports was sent, at the opening of Congress at Seville, to those members of the Congress who stated that they had not received one before their departure for Seville.

A *second circular*, published similarly in three languages, was sent to delegates on February 7, 1923. It contained more detailed information than the first, and in particular :

1. The composition of the Committees of Honour, of the Local Organizing Commission, and the Entertainments and Excursions Committee;
2. The exact date of the Congress;
3. The list of the Delegates of Governments which had accepted the invitation of the Spanish Government to be represented at the Congress (list prepared as on January 1st 1923);
4. The programme for the use of the time and the programme on Entertainments and Excursions;
5. The reductions granted by the different rail and steamship companies for the journey to Seville;
6. The list of hotels in Seville with information as the prices of rooms and meals in each case;



7. Different information and advice regarding the organization of the Congress, the distribution of documents and information during the session, etc.;
8. A summary of the conditions of admission to the Congress;
9. The programme of subjects to be dealt with at the Congress, with the list of Rapporteurs.

This second circular was, like the first, distributed as widely as possible; the publicity thus carried out with the assistance of the Executive Bureau and the First Delegates of the countries on the Permanent International Commission produced the best results. The following table shows, by nationality, the number of delegates of Governments or Corporations and also that of the adherents.

This table shows also that, out of 55 nationalities represented at the Congress, the Governments of 45 of them had nominated official delegates to take part in its work. The number of temporary members amounted to 330, exclusive of Associate members to the number of 220 (individuals belonging to a Member's family being admitted upon payment of a reduced subscription of 15 francs entitling them to attend the meetings and take part in the excursions, but not giving them the right to receive the reports and other technical documents).

At its meeting on May 7, 1923, held immediately before the opening of the Congress, the Permanent Bureau of the International Commission of Road Congresses proceeded, in accordance with Article 5 of the Rules, to the appointment of a General Bureau of the Congress and of the Sectional Bureaux.

The Executive Bureau of the Association in agreement with the Spanish Government proposed to appoint Sr. D. A. VALENCIANO as General President of the Congress.


This proposal was unanimously approved, as was also the appointment of Sr. D. Luis PROTA, as General Secretary of the Congress.

The Assembly similarly accorded to Mr. LAGASSE DE LOCHT, formerly General President of the Second Congress (Brussels







 *Emblem*

**Sr. D Luis PROTA**

General Secretary of the Congress



SERIAL NUMBER	NATIONALITIES  REPRESENTED AT THE CONGRESS	NUMBER						TOTAL NUMBER OF THE AUTHORIZED MEMBERS of the Congress
		OF DELEGATES			OF MEMBERS			
		OF GOVERNMENTS		OF COR- PORATIONS	PERMANENT (Members of the Association)	TEMPORARY (Members of the IV Congress only)	ASSOCIATE	
		to the P. I. C. and IV Congress	to the IV Congress only					
1	Algeria.....	1	"	2	3	2	"	8
2	Argentina.....	1	"	2	15	"	"	18
3	Australia.....	"	"	3	2	"	"	5
4	Belgium.....	6	7	33	65	8	15	135
5	Brazil.....	"	"	5	12	"	"	17
6	Bulgaria.....	"	2	"	"	"	"	2
7	Canada.....	"	"	2	3	"	"	5
8	Ceylon.....	"	1	"	"	1	"	2
9	Chile.....	"	2	2	4	"	"	8
10	China.....	1	"	2	4	"	1	8
11	Costa Rica.....	"	1	"	"	"	"	1
12	Cuba.....	1	"	2	"	2	"	5
13	Denmark.....	1	"	9	7	7	"	28
14	Dominican Republic.....	"	1	"	"	"	"	1
15	Egypt.....	"	"	"	3	"	"	3
16	Spain.....	4	"	8	28	228	107	375
17	Estonia.....	1	"	"	"	"	"	1
18	United States.....	"	"	8	150	1	7	168
19	Finland.....	1	"	"	"	"	"	1
20	France.....	15	7	148	284	9	32	495
21	Gibraltar.....	"	2	"	"	"	"	2
22	Great Britain.....	5	20	36	93	48	23	225
23	Greece.....	1	"	"	3	"	"	4
24	Guatemala.....	"	1	"	"	"	"	1
25	British India.....	"	1	1	3	"	"	5
26	Dutch East Indies.....	1	"	"	2	"	"	3
27	Indo-China.....	1	"	1	1	"	"	3
28	Ireland.....	"	"	"	3	3	"	6
29	Italy.....	2	4	11	28	11	6	62
30	Japan.....	1	3	2	8	"	"	14
31	Kenya.....	"	1	"	"	"	"	1
32	Luxemburg.....	1	"	"	5	"	"	6
33	Madagascar.....	"	"	"	1	"	"	1
34	Morocco.....	1	"	1	4	"	"	6
35	Mexico.....	1	1	1	1	"	"	4
36	Monaco.....	2	1	1	5	"	"	9
37	Norway.....	1	1	2	"	"	"	4
38	New Zealand.....	"	1	"	1	"	"	2
39	Panama.....	"	1	"	"	"	"	1
40	Paraguay.....	"	1	"	"	"	"	1
41	Netherlands.....	1	2	7	34	5	5	51
42	Peru.....	"	"	"	1	"	"	1
43	Poland.....	1	"	2	8	"	"	11
44	Portugal.....	1	"	3	10	3	6	23
45	Roumania.....	2	1	1	11	"	"	16
46	Russia.....	"	"	"	"	3	1	4
47	Saar.....	1	"	"	"	"	"	1
48	Serb, Croat and Slovene State.....	"	2	"	"	"	"	2
49	Siam.....	1	"	"	2	"	"	3
50	Sweden.....	1	"	3	27	1	3	35
51	Switzerland.....	3	"	9	17	6	7	42
52	Syria.....	"	"	"	1	"	"	1
53	Czechoslovakia.....	1	2	4	23	"	2	32
54	Tunis.....	1	"	13	1	"	1	16
55	Uruguay.....	1	1	"	7	"	"	9
	TOTAL.....	63	67	324	879	338	220	1892

1910), who was present at Seville, the title of Honorary President of the Fourth Congress.

The sessions of the Congress were held in the Palace of the Ibero-American Exhibition.

The opening session was presided over by H. R. H. Don CARLOS OF BOURBON, Captain-General of Andalusia, supported by H. E. the Minister of Fomento, and His Holiness the Archbishop of Seville.

The closing session was presided over by H. E. the Under-Secretary of State for the Ministry of Fomento.

The debates of the Sections of the Congress were carried on simultaneously in the Palace of the Exhibition.

The discussions, which were always very courteous and often very lively, were carried on methodically and arrived at the adoption of conclusions which were approved with slight modifications, by the General Assembly at the Closing Session on May 12. These conclusions are reproduced in full at the end of these Proceedings.

During the closing Session of the Congress, Mr. M. C. Isacco, First Delegate for Italy, expressed to Members of the Fourth Congress, the desire of the Italian Government to see the Fifth Congress held in Italy. This statement was warmly welcomed and was referred to the Permanent International Commission upon which, according to the Regulations, devolves the duty of giving effect to it.

Excursions of a very interesting character were organized during and after the meeting; in addition, brilliant receptions were given for the delegates. On account appears in this volume under the heading : "Receptions and Excursions" and therefore we shall confine ourselves here to briefly summarizing the programme.

*Monday, May 7.* — Reception and garden-party (in the gardens of the Ibero-American Exhibition), given for members of the Congress by the Municipality of Seville.

*Tuesday, May 8.* — Organ recital in the Cathedral. In the evening, a performance at the theatre arranged for Members of

the Congress by the Organization Commission and the Local Committees.

*Wednesday, May 9.* — Excursion to Tablada, training of bulls in the country.

*Thursday, May 10.* — Bull-fight in the Plaza de Toros. In the evening, Andalusian Fête.

*Friday, May 11.* — Excursion in the environs of Seville to Alcala de Guadaira and to Italica.

*Saturday, May 12.* — Banquet given for all the delegates by the local Organization Commission.

*Sunday, May 13.* — Steamboat excursion on the Guadalquivir.

*Monday, May 14, Tuesday 15, Wednesday 16.* — Excursion to Grenada and Cordoba.

The final banquet was particularly brilliant. Very warm thanks and congratulations were offered to the local Organization Commission, particularly its Chairman, Sr. D. A. VALENCIANO, its General Secretary, Sr. D. Luis PRORA, as well as to all their colleagues.

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The Executive Bureau of the Permanent International Association which has already associated itself with these sentiments at Seville, takes advantage of this opportunity to renew its congratulations here.

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\* \*

The Fourth International Road Congress has no cause to be jealous of its predecessors : it has been as brilliant and as instructive, and its success as complete and as striking.



# **HONORARY COMMITTEE**

AND

## **LOCAL ORGANISATION COMMISSION**

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**Honorary President : H. M. THE KING OF SPAIN.**

### **HONORARY COMMITTEE**

#### **Presidentes honorarios :**

**Excmo. Sr. Presidente del Consejo de Ministros.**  
« **Sr. Ministro de Fomento.**  
« **Sr. Ministro de la Guerra.**  
« **Sr. Ministro de Hacienda.**

#### **Vicepresidentes honorarios :**

**Sr. Alcalde de Sevilla.**  
**Sr. Presidente de la Diputación provincial de Sevilla.**  
**Sr. Director general de Obras públicas.**  
**Sr. Presidente del Real Automóvil Club.**  
**Sr. Director de la Escuela de Caminos, Canales y Puertos.**  
**Sr. Presidente del Consejo de Obras públicas.**  
**Sr. Presidente del Instituto de Ingenieros Civiles.**  
**Sr. Presidente de la Asociación de Ingenieros.**  
**Sr. Rector de la Universidad de Sevilla.**  
**Sr. Marqués de Foronda Consejero de Tranvías.**  
**Sr. Delegado de Hacienda de Sevilla.**  
**Sr. Coronel Director del Centro Electrotécnico y de Comunicaciones.**

### **LOCAL ORGANISING COMMISSION**

**Presidente : Sr. Don Antonio VALENCIANO.**  
**Vicepresidente : Sr. Don R. OCHANDO.**  
**Vicepresidente : Sr. Don A. HERNÁNDEZ.**  
**Secretario General : Sr. Don Luis PROTA.**

## Vocales :

Sres. Ingenieros Jefes de Obras públicas de las provincias de Sevilla, Cádiz, Málaga, Huelva, Córdoba, Granada, Badajoz y Madrid.

Sres: Ingenieros Jefes de Minas, Montes y Agrónomos y del Catastro de Sevilla.

Sr. Presidente de la Asociación de Ingenieros Industriales de Sevilla.

Sr. Coronel de la Pirotecnica de Sevilla.

Sr. Director del Puerto de Sevilla.

Sr. Ingeniero del Ayuntamiento de Sevilla.

Sr. Ingeniero de la Diputación de Sevilla.

Sr. Presidente de la Sociedad Automovilista sevillana.

Sr. Presidente de la Cámara de Comercio de Sevilla.

Sr. Presidente de la Cámara Agrícola de Sevilla.

Sr. Presidente de la Juntas de Obras del Puerto de Sevilla.

Sr. Coronel Ingeniero Comandante de Sevilla.

Sr. Coronel Jefe de Estado Mayor de Sevilla.

**LOCAL HONORARY COMMITTEE**

Presidente : Excmo. Sr. Capitan general de la Región, S. A. R. el Infante Don Carlos DE BORBON.

## Vocales :

Excmo. Sr. Don Carlos CANAL, Ex Ministerio de la Corona.

Excmo. Sr. Conde DE COLOMBI, Comisario Regio de la Exposición Ibero Americana.

Excmo. Sr. Gobernador Civil de la provincia de Sevilla.

Excmo. Sr. Don Estanislao D'ANGELO, Ex Director general de Obras públicas.

Excmo. Sr. Don Nicolas LUCA DE TENA, Senador Vitalicio.

Excmo. Sr. Marqués DE TABLANTES, Teniente Hermano mayor de la Real Maestranza de Caballeria de Sevilla.

Excmo. Sr. Marqués DE ARACENA, Diputado a Cortes y Comisario Regio de Seguros.

Excmo. Sr. Marqués DE TORRENUEVA, Senador y Alcalde de Sevilla.

**EXECUTIVE COMMITTEE**

**Presidente :** Excmo. Sr. Don Antonio VALENCIANO.

**Secretario General :** Sr. Don Luis PROTA.

**Vocales :** Excmo. Sr. RAMÍREZ DORESTE.

Sr. Presidente de la Junta de Obras del Puerto de Sevilla.

Presidente de la Cámara de Comercio de Sevilla.

Presidente de la Cámara Agrícola de Sevilla.

Presidente de la Comisión de Hacienda Ayuntamiento de Sevilla.

**RECEPTIONS AND EXCURSIONS COMMITTEE**

**Presidente :** Excmo. Sr. Conde HALCON, Alcalde de Sevilla.

**Vicepresidentes :** Excmo. Sr. Don Luis MOLINI, Inspector general de Caminos, Canales y Puertos.

Excmo. Sr. Don Antonio COMBER, Director general de los f. c. Andaluces.

**Secretarios :** Don Carlos PINAR Y PICKMAN.

Don Leandro SEQUEIROS, Ingeniero industrial.

**Vocales :**

Los Sres. Ingenieros de Obras públicas de la provincia de Sevilla.

Don Ramon DE MANJARRÉS PÉREZ DE JUNQUITU, Ingeniero industrial.

Don Eusebio ROJAS MARCOS, Ingeniero de Caminos.

Don Manuel PINAL GONZALEZ, Consejal del Ayuntamiento de Sevilla.

Don Alberto CANDAU, Ingeniero Agronomo.

Don Prudencio VERASTEGUI, Ingeniero de Montes.

Don Miguel DELGADO, Ingeniero de Minas.

Presidentes de los circulos, Labradores, Sevillano, Mercantil, Nuevo Casino y Unión Comercial.

Don José Ma PINAR Y PICKMAN, Secretario de la R. S. A. S.

# PROGRAMME OF THE SUBJECTS

AND

## NAMES OF THE AUTHORS

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### 1st Section

### CONSTRUCTION AND MAINTENANCE

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#### 1st QUESTION

#### Surfacing of Roads with Concrete.

##### *General Reporter :*

Sr. Don Manuel AGUILAR, Professor, Escuela de Ingenieros de Caminos, Canales y Puertos, Madrid.

##### *Reporters :*

1. Belgium. — *In collaboration* : MM. MÜHLEN (M.), Ingénieur principal des Ponts et Chaussées à Bruxelles; GOORIECKX (J.), Ingénieur principal des Ponts et Chaussées, and CLAEYS, Ingénieur principal des Ponts et Chaussées à Bruxelles
2. Canada. — Mr. GORDON GRANT, Chief Engineer, Highways Branch, Department of Railways and Canals, Ottawa.
3. United States. — *In collaboration* : MM. Duff A. ABRAMS, Professor in charge, Structural Materials Research Laboratory, Lewis Institute, Chicago (Ill.); E. C. BLOSSER, State Highway Engineer of Ohio, Columbus (Ohio); H. Eltinge BREED, Consulting Highway Engineer, New York City; Roy W. CRUM, Engineer of Materials and Tests, Iowa Highway Commission, Ames (Iowa); Arthur W. DEAN, Chief Engineer, Division of Highways, Massachusetts Department of Public Works, State House, Boston (Mass.); C. R. EGE, Manager, Highways Bureau, Portland Cement Association, Chicago (Ill.); H. J. KUELLING, Construction Engineer, Wisconsin Highway Commission, State Capitol Annex, Madison (Wisconsin); H. S. MATTIMORE, Engi-

neer of Tests, Pennsylvania State Highway Department, Harrisburg (Pa.); Clifford OLDER, Chief Highway Engineer, Illinois Department of public Works, Springfield (Ill.), and B. H. WAIT, District Engineer, Portland Cement Association, New York City.

4. France. — *In collaboration* : MM. VARTIER, Ingénieur en chef des Ponts et Chaussées à Lyon. and NICOLAS, Ingénieur des Ponts et Chaussées à Paris.
5. Great Britain. — A. DRYLAND, M. Inst. C. E., County Engineer of the Middlesex County Council.
6. Italy. — *In collaboration* : MM. le Professeur Ing. Luigi LUIGI, Ispettore superiore del Genio civile, Deputado al Parlamento à Rome, and Italo VANDONE, Ingegnere, Direttore del Instituto sperimentale stradale del Touring Club italiano.
7. Netherlands. — M. P. J. VAN VOORST VADER (Jr.), Ingenieur van den Rijkswaterstaat, Haarlem.
8. Sweden. — M. G. DAHLBERG, Ingénieur, Djursholm.

## 2nd QUESTION

### Use of Bitumen and Asphalt for Surfacing.

*(The use of tar and its derivatives is not comprised in this subject.)*

#### General Reporter :

Sr. Don José Maria SAINZ, Ingeniero de Obras publicas de la Provincia de Palencia.

#### Reporters :

9. Belgium. — M. DE ROUCK (J.), Ingénieur principal des Ponts et Chaussées à Bruxelles.
10. Canada. — Mr. A. W. CAMPBELL, Chief Commissioner, Highways Branch, Department of Railways and Canals, Ottawa.
11. Denmark. — *In collaboration* : MM. RYGNER (H.), Ingénieur municipal à Odense, and WESTERGAAARD (V.), Ingénieur municipal, Gjentofte.
12. United States. — *In collaboration* : Julius ADLER, Deputy Chief, Bureau of Highways of Philadelphia, City Hall, Philadelphia (Pa.); Lieut. Col. Walter Wilson CROSBY, Highway Engineer, National Park Service, Coronado (Cal.); G. C. DILLMAN, Deputy State Highway Commissioner of Michigan, Lansing (Mich.); George P. HEMSTREET, Vice-President, Hastings Pavement Company, Hastings-on-Hudson, New York; PREVOST-

HUBBARD, Chemical Engineer, The Asphalt Association, New York City; William H. KERSHAW, Manager, Asphalt Sales Department, The Texas Cy, New York City; Leroy M. LAW, Chief Chemist, New Orleans Refining Cy Inc., New Orleans (La.); Irving W. PATTERSON, Chief Engineer, Rhode Island State Board of Public Roads, Providence (R. I.); Clarence A. PROCTOR, Superintendant of Asphalt Construction, City Hall, Detroit (Mich.); John R. RABLIN, Chief Engineer, Park Engineering, Massachusetts Metropolitan District Commission, Boston (Mass.); Francis P. SMITH, Dow et Smith, Consulting Paving Engineers, New York City, and W. Leroy ULRICH, Superintendant of Repairs, Connecticut State Highway Department, Hartford (Conn.).

13. France. — M. GUILLET, Ingénieur en chef des Ponts et Chaussées à Versailles.
14. Great Britain. — *In collaboration* : J. S. KILLICK C. B. E., M. Inst. C. E., late Chief Engineer of the Roads Department of the Ministry of Transport, London, and T. G. MARRIOTT, Technical Director Limmer and Trinidad Lake Asphalt Co Ltd London.
15. Italy. — *In collaboration* : MM. Paolo CATTANEO, Ingénieur, Directeur de la Voirie de Milan, and Luigi TORRI, Ingénieur, ancien Directeur du Laboratoire expérimental de la Municipalité de Milan.
16. Switzerland. — M. STEINER (Fritz), dipl. Ing., gewes, Stadtingenieur von Bern.

### 3rd QUESTION

Laying tramway-rails on the various kinds of road surface.

#### General Reporter :

Sr. Don Luis DICENTA, Ingeniero Jefe de Obras publicas de la Provincia de Valencia.

#### Reporters :

17. Argentina. — M. Victor SPOTA, Directeur Général des Travaux publics de la Municipalité de Buenos-Aires.
18. Belgium. — *In collaboration* : MM. LUYSEEN (G.), Ingénieur des Ponts et Chaussées à Bruxelles; Van NOORBEECK, Inspecteur Général des voies et travaux à la Société Nationale des Chemins de fer vicinaux à Bruxelles, and Ernest D'HOOP, Ingénieur-Directeur du Service Technique de la « Société des Tramways Bruxellois ».
19. Denmark. — M. RYGNER (H.), Ingénieur municipal à Odense.

20. United States. — *In collaboration* : S. CLAY BAKER, Engineer, Maintenance of Way, East St. Louis and Suburban Railway, East-St-Louis (Ill.); C. B. BREED, Professor of Railway and Highway Engineering, Massachusetts Institute of Technology, Cambridge (Mass.); Col. R. Keith COMPTON, Chairman and Consulting Engineer, Paving Commission, Baltimore (Md.); Clarence E. DE LEUW, Engineer, Kelker, De Leuw and Company, Chicago (Ill.); W. W. HORSER, Vice-President, American Society for Municipal Improvements and Chief Engineer of Sewers and Paving, St-Louis (Missouri); Hector James HUGHES, Professor of Civil Engineering and Dean of the Engineering School, Harvard University, Cambridge (Mass.); George H. NORTON, City Engineer, Municipal Building, Buffalo (N. Y.); Clarence D. POLLOCK, Consulting Civil Engineer, Park Row Building, New York City; Robert RIDGEWAY, Chief Engineer, Transit Commission of the State of New York, New York, and George W. TILLSON, Consulting Highway Engineer, La Grange (Ill.).
21. France. — M. MARIAGE, Président du Conseil d'Administration de la Société des Transports en commun de la région parisienne à Paris
22. Great Britain. — John A. BRODIE, Whit. Sch., M. Eng., P. P. Inst. C. E., M. Inst. Mech. E. City Engineer of Liverpool.
23. Italy. — *In collaboration* : Comm. Ing. Massimo SETTINI, Capo Servizio strade dell' Ufficio tecnico municipale di Roma, and Civ. Ing. Ugo COSTE, Direzione dell' Ufficio tecnico municipale di Roma.
24. Netherlands. — M. J. J. L. SMITS, Directeur du Service communal d'Electricité et des Tramways, Utrecht.
25. Switzerland. — *In collaboration* : MM. MOOR (Karl), Adjunkt des Kantonsingenieurs in Basel, and BERNATH (August.), Strasseninspektor, Zurich.

### COMMUNICATION

**Progress made in modern mechanical appliances used in the Construction and maintenance of Roads.**

#### *Reporters :*

26. „
27. United States. — *In collaboration* : T. R. AGO, Professor of Highway Engineering, Iowa State College, Ames (Iowa); George P. COLEMAN, State Highway Commissioner of Virginia and Chairman, Executive Committee, American Association of State

Highway Officials, Williamsburg (Virginia); A. W. Dow, Dow & SMITH, Consulting Paving Engineers, New York City; Henry B. DROWNE, Division Engineer, The Lane Construction Corporation, Longmeadow (Mass.); Halbert P. GILLETTE, Editor-in-Chief, Engineering and Contracting, Chicago (Ill.); A. H. HINKLE, Chief Engineer of Maintenance, Indiana State Highway Commission, Indianapolis (Ind.); A. B. McDANIEL, Education and Engineering Specialist, U. S. War Department, Washington (D. C.); Frank F. ROGERS, State Highway Commissioner of Michigan, Lansing (Mich.); Paul D. SARGENT, Chief Engineer, Maine State Highway Commission, Augusta (Maine), and Charles M. UPHAM, Secretary, American Association of State Highway Officials and State Highway Engineer of North Carolina, Raleigh (North Carolina).

28. France. — M. GÉRIN, Agent voyer en chef du Département des Bouches-du-Rhône à Marseille.
29. Great Britain. — *In collaboration* : Albert E. BROOKES, O. B. E., M. Inst. C. E., M. Inst. T., and M. Inst. Mun. I: C. E., County Engineer and Surveyor, Durham County Council and Arthur E. COLLINS, M. Inst. C. E., Post President Inst. M. I. C. I. M. Inst. T., City Engineer, Norwich.

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## 2nd Section

### TRAFFIC AND DEVELOPMENT

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#### 4th QUESTION

#### The Development of Motor Transport.

##### *General Reporter :*

Sr. Don BLAS SORRIBAS, Ingeniero Jefe de Obras publicas de la provincia de Barcelone.

##### *Reporters :*

30. „
31. Spain. — M. Félix RAMIREZ DORESTE, Ingeniero Jefe de Obras publicas de la Provincia de Sevilla.
32. United States. — *In collaboration* : Austin F. BEMENT, Vice-President and Secretary, The Lincoln Highway Association, Détroit



- (Mich.); Arthur H. BLANCHARD, President, National Highway Traffic Association, and Professor of Highway Engineering and Highway Transport, University of Michigan, Ann Arbor (Mich.); Lieut. Col. H. L. BOWLBY, President, American Road Builder's Association, and Senior Highway Engineer, U. S. Bureau of Public Roads, Washington D. C.; Roy D. CHAPIN, Vice-President, National Automobile Chamber of Commerce, and President, Hudson Motor Car Company, Detroit (Mich.); James H. COLLINS, Manager, Commercial Survey Department, The Chilton Company, Philadelphia (Pa.); Charles Henry DAVIS, President, National Highways Association, Cambridge (Mass.); Ernest FARR, Chief, Firestone Ship-by-Truck Bureau, Akron (Ohio); F. W. FENN, Secretary, National Motor Truck Committee, National Automobile Chamber of Commerce, New York City; H. P. GOULD, Chairman, Truck Owners' Conference, Inc., Chicago (Ill.); William K. HATT, Director, Advisory Board of Highway Research, National Research Council and Professor of civil engineering, Purdue University, Lafayette (Ind.); Theodore R. KENDALL, Engineering Editor, The American City, New York City; General T. COLEMAN DU PONT, United States Senator from Delaware, and Chairman Board of National Councilors, National Highways Association, Wilmington (Del.); Henry E. RIGGS, Professor of civil Engineering, University of Michigan, Ann Arbor (Mich.); Leonard S. SMITH, Professor of Highway Engineering, University of Wisconsin, Madison (Wisconsin); Tom SNYDER, Secretary, National Association of Commercial Haulers, Indianapolis (Ind.) and Lieut. Col. W. D. UHLER, Chief Engineer, Pennsylvania State Highway Department, Harrisburg (Pa.).
33. France. — *In collaboration* : MM. MARÉCHAL, Membre du Comité central de l'Union des voies ferrées d'intérêt local et des Transports publics automobiles de France à Paris, and F. BORDAS, Directeur honoraire au Ministère des Travaux publics, Secrétaire Général administratif de l'Union des voies ferrées d'intérêt local et des Transports publics automobiles de France à Paris.
34. Great Britain. — F. PICK, London Underground Railways.
35. Italy. — *In collaboration* : Avv. Francesco LA FARINA, Capo sezione nell' Ufficio speciale per le Ferrovie, tramvie ed automobili (Ministero dei Lavori Pubblici); Ing. Paolo LATTANZI, Primo Ispettore nell' Ufficio speciale per le Ferrovie, tramvie ed automobili (Ministero dei Lavori Pubblici), and Ing. Ugo CANTALAMESSA, Capo dell' Ufficio tecnico provinciale di Roma.
36. Netherlands. — M. VAN VOORST VADER (Jr.), Ingenieur van den Rijkswaterstaat à Haarlem.

37. Switzerland. — M. AMMANN, Ingénieur et Secrétaire de l'Union suisse des Professionnels de la Route, Berne.
38. Tcheco-Slovaquie. — M. HLOUSEK, (Anton.), Ingénieur, Conseiller au Ministère des Travaux publics à Prague.

## 5th QUESTION

### General Traffic Regulations.

#### *General Reporter :*

Sr. Don FRANCISCO DE ALBACETE, Ingeniero Jefe de Obras Publicas de la Provincia de Madrid.

#### *Reporters :*

39. Belgium. — M. d'Aoust (P.), Secrétaire Général du Royal Automobile Club de Belgique, à Bruxelles.
40. Canada. — Mr. W. G. ROBERTSON, Secretary Treasurer Ontario Motor League, Toronto.
41. „
42. Spain. — M. RESINES, Secrétaire Général du Real Automovil Club de España, Madrid.
43. United States. — *In collaboration* : David BEECROFT, Directing Editor, The Class Journal Company, New York City; Charles J. BENNETT, Vice-President, American Association of State Highway Officials, and State Highway Commissioner of Connecticut, Hartford (Conn.); Julian CHASE, Executive Editor, The Class Journal Company, New York City; George O. DIEHL, President, American Automobile Association and Engineer, Erie County, New York, Buffalo (New York); M. O. ELDRIDGE, Director of Roads, American Automobile Association, Washington D. C.; William S. GILBREATH, Manager, Detroit Automobile Club Detroit (Mich.); R. HIRST, State Highway Engineer of Wisconsin, Madison (Wisconsin); John N. MACKALL, Chairman and Chief Engineer, Maryland State Roads Commission, Garrett Building, Baltimore (Md.); D. Q. McCOMB, Chief Engineer, Tennessee Department of Highways, Nashville (Tenn.); Harry MEIXELL, Secretary, Motor Vehicle Conference Committee, New York City; George H. PRIDE, Treasurer, National Highway Traffic Association and President, Heavy Haulage Co, New York City; Henry G. SHIRLEY, Chairman, Good Roads Board, American Automobile Association, and Road and Sanitary Engineer, Baltimore County, Towson (Md.); Elmer THOMPSON, Secretary and General Manager, Automobile Club of America, and Secretary, National Highway Traffic Association, New York City.

44. France. — M. CHAIX (E.), Vice-Président de l'Automobile-Club de France, Président de la Commission de Tourisme et de Circulation générale de l'Automobile-Club de France.
45. Great Britain. — *In collaboration* : E. SHRAPNELL SMITH, C. B. E., President of the Commercial Motor Users Association, Chairman of the Standing Joint Committee of Mechanical Road Transport Associations, Vice-President of the Institute of Transport; J. S. POOL GODSELL, M. B. E., of H. M. Ministry of Transport and G. W. WATSON, M. I. Mech. E., M. I. A. E.
46. Italy. — *In collaboration* : Avv. Michele Carlo ISACCO, Direttore generale di Ponti e Strade, Ministero dei Lavori Pubblici, Rome, and Ing. Italo VANDONE, Direttore dell'Istituto sperimentale stradale del Touring-Club italiano.
47. Netherlands. — M. W. C. D. HAARMAN, Ingénieur de la Société « Jonkhoff », à Vught, près Bois-le-Duc.
48. Sweden. — M. WRETLIND (E.-Paul), C.-E., Stockholm.
49. Tchéco-Slovaquie. — *In collaboration* : M. SVOBODA (Joseph), Ingénieur, Conseiller ministériel au Ministère des Travaux Publics à Prague, and JANAK (Zdenko), Ingénieur, Conseiller au Ministère des Travaux publics à Prague.

#### 6th QUESTION

#### The problem of Traffic on congested roads and Streets of Towns.

##### *General Reporter :*

Sr. Don Enrique MARTINEZ, Ingeniero Jefe de Obras publicas de la Provincia de Cadiz.

##### *Reporters :*

50. „
51. Belgium. — M. HANSEZ (J.), Questeur du Conseil Provincial du Brabant, Président de la Commission de Tourisme du Royal Automobile-Club de Belgique, à Bruxelles.
52. „
53. United States. — *In collaboration* : Henry C. ALLEN, Consulting Civil Engineer, Syracuse Savings Bank Building, Syracuse, New York; J. ROWLAND BIBBINS, Manager, Department of Transportation and Communication, Chamber of Commerce of the U. S. A., Washington D. C.; William P. ENO, Traffic Expert, Washington D. C.; H. J. FIXMER, Civil Engineer in charge of Pavement Design and Construction, Chicago Board of Local Improvements, Chicago (Ill.); Nelson P. LEWIS.

- Member, Commission on the Port of New York, New York City ; R. S. McELWEE, Dean, School of Foreign Office, Georgetown University, Washington D. C. ; Frank T. SHEETS, Illinois State Superintendent of Highways, State Capitol Bldg., Springfield (Ill.) ; Herschel C. SMITH, Asst. Prof. of Highway Engineering and Highway Transport, University of Michigan, Ann Arbor (Mich.) ; Jas C. TRAVILLA, Consulting Engineer, St-Louis (Missouri), and George A. WALTERS, Second Deputy Commissioner, Department of Police, Detroit (Mich.).
54. France. — *In collaboration* : MM. MASSARD (E.), Président de la 2<sup>e</sup> Commission du Conseil Municipal de Paris, and BIETTE, Inspecteur général des Ponts et Chaussées, chargé du Service de la Voie publique et de l'Eclairage de la Ville de Paris.
55. Great Britain. — *In collaboration* : W. REES JEFFREYS, Chairman of the Roads Improvement Association, Late Secretary of the Road Board of the United Kingdom, Hon. Secretary of the Third (London) Congress, A. E. Cave, J. P. Parliamentary Secretary Motor Legislation Committee and Joint Hon. Secretary London Safety First Council and R. P. Hearne.
56. Italy. — M. BERTARELLI (Luigi), Direttore Generale del Touring-Club italiano.
57. „
58. Sweden. — M. C. H. BERGMAN, Ingénieur de district du Bureau municipal des constructions de la Ville de Stockholm, capitaine au corps des Ponts et Chaussées, Stockholm.
59. Switzerland. — M. SCHWITZGUEBEL (J.), Commandant de la Gendarmerie du Canton de Genève.



**CHRONOLOGICAL ORDER**  
OF THE  
**PROCEEDINGS, RECEPTIONS AND EXCURSIONS**  
**OF THE CONGRESS**

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**Monday, May 7th.**

From 9 a. m. to 12 and from 2 to 6 p. m. — The distribution and enquiries offices are opened at the office of the Congress (*Hispano-American Exhibition Hall*).

At 10 a. m. — Meeting of the Permanent International Commission (*Exhibition Hall*).

At 11.30 a. m. — Meeting of the Permanent International Bureau (Appointment of the General and Sectional Boards of the Congress).

At 5 p. m. — Formal opening of the Congress (at the *Exhibition Hall*).

At 5.30 p. m. — Reception and Garden-party (in the Gardens of the Exhibition), offered to the Congressists by the *Sevilla City Council*.

**Tuesday, May 8 th.**

At 9.30 a. m. — Meetings of the Sections (*Exhibition Hall*) :—

1st. Section : 1st. Question.

2nd. Section : 4th. Question.

In the afternoon. — Organ Recital in the Cathedral.

At 10 p. m. — Theatre. Performance offered by the Commission and Local Committees.

**Wednesday, May 9th.**

At 9.30 a. m. — Meetings of the Sections :—

1st. Section : 2nd. Question.

2nd. Section : 5th. Question.

At 3 p. m. — Excursion to Tablada : Training of bull in the country.

**Thursday, May 10th.**

*(Fête of the Ascension).*

Visit of the monuments and curiosities of Sevilla.

In the afternoon. — Corrida de toros and Paseo (Bull fight and drive).

At 10 p. m. — Andalusian Fête.

**Friday, May 11th.**

At 9.30 a. m. — Meetings of the Sections : —

1st. Section : 3rd. Question.

2nd. Section : 6th. Question.

At 2.30 p. m. — Excursion in the neighbourhood of Sevilla (Alcala de Guadaira, Italica).

**Saturday, May 12th.**

At 10 a. m. — Meeting of the Permanent International Bureau.

At 3 p. m. — Closing meeting of the Congress.

At 8.30 p. m. — Banquet.

**Sunday, May 13th.**

At 2.30 p. m. — Excursion on the Guadalquivir.

**Monday, Tuesday & Wednesday  
(May 14th, 15th & 16th).**

Excursion to Grenada and Cordova.

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# GENERAL BOARD OF THE CONGRESS

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## General Presidency.

### *President :*

Sr. Don A. VALENCIANO, Sub-Director de Obras Publicas: Jefe de la Seccion de Ferrocarriles, Ingeniero Jefe de Caminos, Canales y Puertos, Ministerio de Fomento, Madrid.

### *General Secretary :*

Sr. Don Luis PROTA, Jefe de Administracion, Ministerio de Fomento, Madrid.

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GIRADO. Ingénieur civil à Paris.

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GEVAERT, Directeur Général des Ponts et Chaussées, à Bruxelles.

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BOUSSEF (Jordan), Chef de la Section des Ponts et Chaussées, Ministère des Travaux Publics, Sofia.

#### **Ceylon**

NETTLETON (O. T.).

#### **Chile**

Don Fernando MARQUEZ, de la Plata.

#### **China**

OUANG HANG. Représentant du Ministère des Communications de Pékin à Paris.

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MM.

**Denmark**

MADSEN (Lt Colonel), Inspecteur Général des Ponts et Chaussées, Copenhague.

**Dominica**

CARRERAS Y CANDI (Don Francisco), Consul à Barcelone.

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OCHANDO Y VALERA (D. Ramon), Jefe de la Seccion de Carreteras, Ingeniero Jefe de Caminos, Canales y Puertos.

HERNANDEZ Y BAYARRI (Don Antonio), Jefe de Estudios y Construcciones de Ferrocarriles del Nordeste de España, Ingeniero Jefe de Caminos, Canales y Puertos.

**Esthonia**

PUSTA, Ministre d'Esthonie à Paris.

**United States**

H. W. BOWLBY (Lt Colonel), Senior Highway Engineer. U. S. Bureau of Public Roads.

**Finland**

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MAHIEU, Conseiller d'Etat, Inspecteur Général des Ponts et Chaussées, Secrétaire Général du Ministère des Travaux Publics, Président de la Délégation Française au IV<sup>e</sup> Congrès, Président du Bureau Exécutif de l'Association Internationale Permanente des Congrès de la Route, Paris.

**Great Britain**

BRESSEY (C. H.), Chief Engineer, Ministry of Transport.

**British India**

HOLMAN HUNT (H. L.), Superintending Engineering.

**Italy**

ISACCO (M. C.), Avocat, Directeur Général des Travaux Publics de l'Italie Centrale. Ministero dei Lavori Publici, Rome.

**Japan**

MATSUMOTO (Gaku), Secrétaire au Ministère de l'Intérieur.



**MM.****France**

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**CHAMPION**, Conseiller Général de la Seine, Paris.

**Great Britain**

**BRODIE (J.)**, City Engineer of the City of Liverpool.

**COOPER RAWSON (A.)**.

**Italy**

**Lo GATTO**, Ingénieur supérieur du Génie Civil à Rome.

**Japan**

**SATO (Toshiyasu)**, Ingénieur au Ministère de l'Intérieur, Tokio.

**Netherlands**

**VAN HEIJST (R. A. D.)**, Ingénieur en Chef des Ponts et Chaussées, La Haye.

**Czecho-Slovakia**

**SVONODA (Joseph)**, Ingénieur. Conseiller au Ministère des Travaux Publics, Prague.

*Secretaries :***Belgium**

**MÜLLEN**, Ingénieur en Chef Directeur des Ponts et Chaussées à l'Administration Centrale, Bruxelles.

**United States**

**CROSBY (Col. W. W.)**, Superintendent, Grand Canyon National Park.

**France**

**NICOLAS**, Ingénieur des Ponts et Chaussées au Service ordinaire du Département de la Seine.

**Great Britain**

**GODSELL (J. S.)**, C. B. E. Ministry of Transport, London.

**Italy**

**LA FARINA**, Avocat, Premier Secrétaire du Ministère des Travaux Publics, Office spécial des Chemins de fer, Tramways et Automobiles, Rome.

**MM. Netherlands**

VAN HOOGSTRAATEN (W. F.), Ingénieur Civil des Travaux Publics de Rotterdam.

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QUIJANO, Profesor de la Escuela especial de Ingenieros de Caminos. Canales y Puertos, Madrid.

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LEBOX, Sénateur, Echevin de la Ville d'Anvers.

**Denmark**

DAHL, Délégué du Kgl. Danak. Automobile-Club, Copenhague.

**United States**

HILL (Samuel), Farmer.

**France**

CHAIK, Vice-Président du Touring-Club de France, Président de la Commission de Tourisme et de Circulation Générale de l'A. C. F., Paris.

MASSARD, Président de la 2<sup>e</sup> Commission du Conseil Municipal de Paris.

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REES JEFFREYS (W.), Chairman of the Roads Improvement Association, London.

SHRAPNELL SMITH, C. B. E., President Motor Users Association, London.

**Italy**

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HLÍSEK (Antoine), Conseiller au Ministère des Travaux Publics, Prague.

*Secretaries :***Belgium**

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**Chile**

AMONATEGUI (Francisco), Délégué à la Commission des Communications et du Transit de la Société des Nations.

**Denmark**

CHRISTENSEN (A. R.), Professeur à l'Ecole polytechnique de Copenhague.

**United States**

PYKE JOHNSON, Washington Representative, National Auto Chamber of Commerce.

**France**

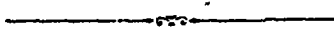
BOURGEOIS, Ingénieur en Chef des Ponts et Chaussées à Strasbourg.

**Great Britain**

HART (E. B.), Secrétaire, Ministère des Transports, Londres.

**Netherlands**

STEFFELAAR (L. C.), Président du Comité des Routes et membre du Conseil d'Administration de l'A. N. W. B. Touring-Club des Pays-Bas, La Haye.



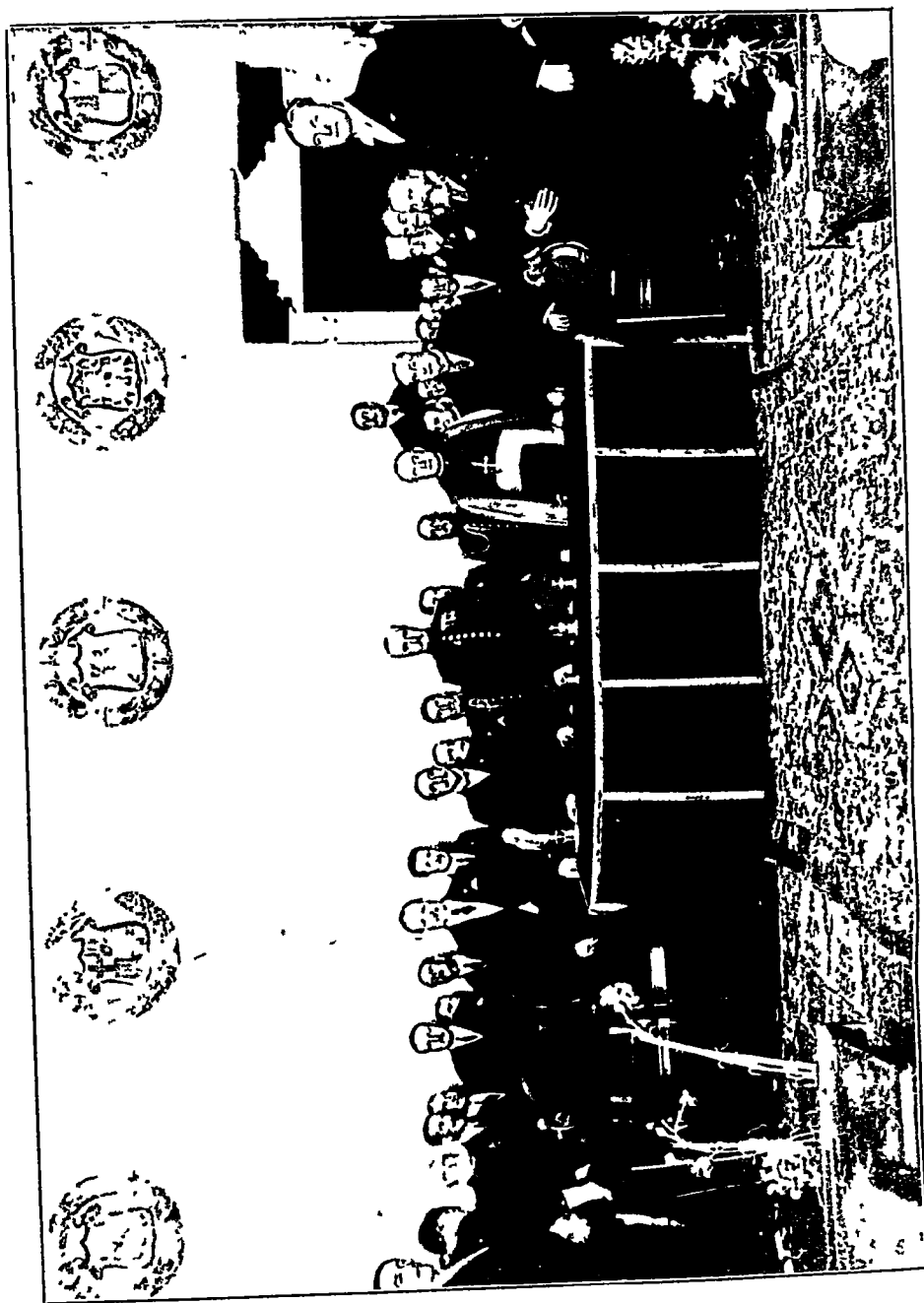
**MINUTES**

**OF THE**

**FIRST PLENARY MEETING**

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**INAUGURAL MEETING**



Formal opening meeting of the Congress

# FIRST PLENARY MEETING

(OPENING SESSION)

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Monday, May 7, 1923

H. R. H. the Infante Don CARLOS DE BOURBON *in the chair.*

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The session opened at 5.30.

The PRESIDENT (H. R. H. the Infante Don CARLOS). — I call upon the Alcade of Seville.

THE ALCALDE OF SEVILLE (speaking in Spanish). — It is in my capacity as the representative of the people of Seville that I rise to address you and to tell you how greatly I wish that you may enjoy yourselves in this country. In the name of Seville, I offer you the warmest and heartiest welcome.

The Organizing Commission, with a view to making your stay in this city enjoyable, has prepared a programme which will enable you to devote the moments of freedom left you by the work of this important Congress to a study of Seville in its three aspects : the artistic, the industrial and the agricultural. From the industrial point of view, we are anxious that you should visit our great factories and that you should be shown the products due to the skill of our workmen. From the artistic point of view, we wish to convince you that there are in this neighbourhood a host of truly delightful monuments, capable, I am sure, of captivating you and exciting your attention. Lastly, from the agricultural point of view, we wish to show you our countryside : some excursions have been arranged with this object. You will see our farms, in which every kind of agricultural work is undertaken and in which full use is made, as in the case of the making of manufactured products referred to just now, of the most modern methods and machinery. We shall conduct you, similarly, to our olive-groves, which produce such rich oils

which are exported to every corner of the globe. We propose, again, to lead you to those pasture-lands, where such famous bulls as those of Miura are bred. Lastly, we wish you to see the land under cultivation, which, thanks to the energy of the Minister of Fomento and a handful of determined men and talented engineers, will, in little more than a few years, cover 24,000 hectares of ground and constitute a source of incalculable wealth.

By way of interlude, the people of Seville will offer delegates some festivities; but we desire above all for you to take away with you, not merely the recollection of an enjoyable stay but also the idea that, besides being a country famous for its dances and its tambourine, Seville is also the home of an industrious and hard-working people. Thus, you will yourselves become the most enthusiastic propagandists of our future Spanish-American Exhibition.

The Municipality of Seville had organised a reception in your honour; but, in view of the brilliant company of ladies whom you have brought with you, we have preferred to give an open-air fête, which will be held shortly in these gardens that are covered with roses and carnations; it is a garden-party that we offer you, so that you may make the acquaintance of the women of Seville.

I will close by repeating to you that Seville, with all her children is entirely at your disposal in its earnest endeavour to make your stay enjoyable, and that it is our keen desire that you may in future remember us with feelings of affection. (*Applause.*)

M. MAHIEU, *President of the Permanent International Association of Road Congresses* (speaking in French) : —

Your Royal Highness, Your Excellency, Your Eminence,  
Ladies and Gentlemen,

My first words will be to greet His Majesty the King of Spain, who has been good enough to accept the position of Honorary President of our Congress, and thus to afford evidence of all the interest which he attaches to our work. No mark of sympathy could be more appreciated by our Association, and I am sure that I am a true interpreter of your thoughts when I offer to His Majesty King ALFONSO XIII the homage of our respect and gratitude.

Ladies and Gentlemen, our gratitude is also due, with warm tokens of respect, to His Royal Highness Don CARLOS OF BOURBON, to His Excellency the Minister of Fomento, who is so well known among us for his technical attainments and for his high authority in the Councils of His Government, and to His Eminence the Reverend Archbishop of Seville, who has been so good as to honour us by his presence here to-day.

When we see our Fourth Congress placed under the patronage of such eminent authorities, our Association cannot fail to be assured of success at its present sittings.

Our thanks are due also to the noble and beautiful city of Seville, celebrated throughout the world for its artistic beauties and the lofty courtesy of its inhabitants. I beg you, Mr. Alcade, in the name of all my colleagues, to tell the people of Seville how extremely grateful we are; and permit me to offer some of our gratitude to you and your colleagues on the Ayuntamiento.

We have also to thank the Spanish Government for all the facilities which it has been so good as to afford us, and we pay homage to the noble Spanish nation, so hospitable and chivalrous, which has ever known how to combine the cult of the Beautiful, of Science and of Art with the practical necessities of the life of a great people.

Ladies and Gentlemen, our Association is particularly indebted to the local Organization Commission of the Fourth Road Congress. When the Spanish Government did us the honour of inviting us, the terrible events which had ravaged the whole world were scarcely passed, and we had to begin again — at least, almost from the start — all the work which had been accomplished in 1908 at the First International Road Congress. This heavy task did not stop our friends and, under the strong and energetic leadership of Don Antonio VALENCIANO, President, and Don R. OCHANDO and Don A. HERNANDEZ, Vice-Presidents, and of Don Luis PROTA, General Secretary, each man set to work with the sole thought of doing for the Fourth Congress an even finer piece of work still, if that be possible, than that which was the outcome of the other three Congresses. Thanks to you, Gentlemen, our Association is already acquainted with the science of Spanish engineers and administrators; it appreciates to-day at their true worth the qualities of organization and devotion which you have displayed.

Success is already there, and the numerous friends of the Road crowded in this hall will join me in greeting with acclaim the names of our organizers and our friends.



Lastly, I thank the City of Seville and all you Gentlemen, who have chosen to decorate once more the magnificent monuments which surround us, and remind us of the heroic and glorious history of your country. There is nothing in the world that can be compared to the marvels of Art which are gilded by the sun of Andalusia, and our dazzled eyes can but bear witness to our admiration which is excited for your beautiful country and to our gratitude to you all.

Ladies and Gentlemen, the International Association of Road Congresses, which was founded in 1908, has been able, during the Great War, to maintain its vitality, and has been able since 1919 to resume the course of its work.

The meetings of the Permanent Commission have been held regularly, the Bulletin has resumed publication, and thus we have been able to bind again the links that unite us all for the greatest good of the science of the Road.

Since the Third Congress, the frequency and the importance of road transportation have asserted themselves more and more; at the present time, the motor lorry has become the indispensable auxiliary of the railway, of the waterway and of the ports. For short distances, through its flexibility and speed, it has become the cheapest and the most sought-after means of transport, and the number of motors of every description in service almost everywhere does not cease to grow with a rapidity that is almost fantastic. But, at the same time, our roads are subject to wear and tear for which they were scarcely constructed, and from all directions we hear a chorus of complaints and recriminations. It is in order to remedy this state of affairs, to find out processes which will enable us, I will not say to make roads that are indestructible, but simply to make good roads, to share the results of our enquiries and experiments and to deduce therefrom the practical means of making our roads less fragile, that we are assembled here to-day. It is a great work with an aspect that is at once social and financial : financial, because it gives to overburdened budgets in every country the hope of not being drained by the ever-increasing costs of road-maintenance.

Intercourse between countries does not cease to develop — to the great benefit of peace and civilization. By getting to know one another more, nations appreciate one another better and understand better their respective interests. To improve the road is to march towards the future.

Our task is great, but I see around me all the good doctors

of the road, all those who are bending over its wounds and endeavouring to staunch or to prevent them; and I have full confidence in final success. Our Association has already done much; much still remains for it to do, and I count on you all, as you may count on us.

Ladies and Gentlemen, the Fourth Congress is about to commence; may it be able, even better than its predecessors, to advance the science of the road and give to our countries a new element of prosperity. (*Applause.*)

M. GIRADO, *delegate of the Argentine Republic* (speaking in Spanish) : —

Your Royal Highness, Your Eminence,  
Your Excellency, and Gentlemen,

It is, for the representative of one of the Nations that are descendants of Spain, of the Nation which I should like to call her favourite daughter, a very great pleasure, to pay homage in the name of the Argentine Republic to His Majesty King ALFONSO XIII, who has deigned to accept the patronage of the Fourth Road Congress; to Spain, who, in such a difficult time, has been good enough to offer us her hospitality; and to Seville, the capital of Andalusia, the Credo of all those conquerors who have brought to American soil the civilization which we represent to-day. For my part, I salute the Land of my ancestors.

The Argentine Republic would have liked to take for herself this hospitality which Spain is now offering us : she would have liked the Fourth Road Congress to have been held this year in Buenos-Aires; but an invitation was first made by the Associations of the United States and it was thought that the Congress would take place in that country. A second invitation reached us almost at the same time from the Italian Government. Thus, after these offers had remained without effect, the Argentine Republic was glad to leave the preference to Spain, considering that it would be for her an honour shared, if the present Congress were to take place in the mother-country.

Although, in the majority of American countries road systems appear in conditions which are still very rudimentary, it is none the less true that in the great centres, in many cities, and even in many villages, streets and avenues are met which follow the rules of the most modern road commission; indeed, certain of

our cities might be proposed as models in this respect. The Congress of Seville is interested in road planning in the cities : Buenos-Aires, with some thousands of kilometres of tramways traversing its streets, has become acquainted, one after the other, with the different improvements which have been noted with regard to tramway-construction : hence she might upon this point, in the programme submitted to the Congress, have been both a model and a practical demonstration.

Before I close I should like to quote in the honour of our Association the true words spoken by Mr. SAINZ, General Reporter for the Second Question, the general purport of which is as follows : " We can now measure the happy results attained by the International Permanent Association of Road Congresses ; by its distinguished and carefully thought-out policy, it has at its previous Congresses, stimulated the birth and development of modern processes of street-laying, results which could never have been achieved if each one had been left to his own resources ". these words might well stand at the head of our Bulletin as a motto addressed to its future adherents as an appeal to union launched throughout the world upon all questions which form the object of our study. (*Applause.*)

M. GEVAERT, *representative of Belgium* (speaking in French):

Your Royal Highness, Your Eminence, Your Excellency,  
Ladies and Gentlemen,

In the name of Belgium, I must first of all offer to His Majesty the King of Spain and to all the Royal Family my respect, admiration and gratitude.

I shall offer my congratulations similarly to the organizers of the Fourth Road Congress, which is going, I am certain, to be crowned with success. It is similarly my function to pay homage to the noble land of Spain and to this city of Seville with their incomparable splendours.

At a moment when the King of Spain is paying a visit to Belgium and is receiving everywhere an enthusiastic welcome, it is particularly pleasing for me to be the spokesman here to-day of the feelings of gratitude which all Belgium bears towards ALPHONSO XIII, whose generous work throughout the war was so great a comfort to Belgium.

Each day sees the bonds of friendship uniting Spain and

Belgium drawn closer and closer together : we do not forget that it is above all to the King ALPHONSO that we owe this kinship between the two peoples. (*Applause.*)

Lieutenant-Colonel MADSEN, *representing Denmark* (speaking in French) : —

Your Royal Highness, Your Excellency, Your Eminence,  
Ladies and Gentlemen,

In the name of the Government of Denmark and of the Colleagues who are with me, I have the honour to offer the most sincere thanks to the Spanish Government, which has done us the honour of inviting us to the Congress held in its beautiful country, to the Permanent International Association, which has been engaged upon the preparations for the Congress, and to the Local Commissions which have reserved for us such a pleasant welcome in this beautiful city where we are living under the charm of your history and your art.

Towards the middle of the last century, Denmark had completed the construction of her road system. Since that time, our roads have suffered the common lot; after first being neglected for the benefit of the railways, they have in our time seen their importance recover, greater than ever, thanks to the development of the motor-car. This, we find ourselves face to face with the same difficulties as everywhere else, to such an extent that we are to-day contemplating a radical improvement of our main roads.

In Denmark, the administration of the roads is completely decentralized, and the Government does no more than supervise generally the maintenance of the main roads. The problems to be solved appear to call for a concentration of both technical and economic forces, but the attempt made by the Government to establish a central organization, analogous to the road Board which formerly existed in England, came to nothing. Under these conditions, Danish road engineers, in conjunction with the different automobile organizations, have endeavoured to find a remedy for the position in the formation of a committee, whose activity, based upon spontaneous co-operation, will have for its object the best solution of the technical questions which may be submitted to it. This Committee, to which a number of the Danish delegates here present belong, joins me in the hope that

the debates which we are about to commence may be able, in large measure, to contribute towards clearing up the great and difficult questions which are facing all road administrations. (*Applause.*)

M. MAHIEU, *representative of France* (speaking in French): —

Your Royal Highness, Your Excellency, Your Eminence,  
Ladies and Gentlemen,

I have the pleasant duty, in the name of my colleagues from France, with whom M. OUANG HANG, delegate from China, associates himself, to express to you all our gratitude, and, I would add, our admiration, for the work which has been accomplished by the local Organization Commission for the Fourth Road Congress. Thanks to the powerful patrons who have given us their support, we are able to-day to advance the science of the road through our work in the wonderful capital of Andalusia, of which Spain is so justly proud.

Here, on every side, rise wonders of Art and of science upon which are founded, in one harmonious whole, the memories of the past and the promises of the future. It is an excellent omen for the future success of the work of the Fourth Congress; and I am sure that Seville will make an epoch in the history of our Association.

It is by meetings such as this that civilized peoples learn to know each other and to appreciate each other, and, for our part, the hearty welcome which has been paid to us can only serve to strengthen the bonds of sympathy — and, I would add, of fellowship — which unite our two countries. All along our common frontier, railways and roads unite us, in ever increasing number, for no people desires to live any longer in isolation from its neighbours and friends.

The noble and generous Spanish nation has known how to show us what treasures of science it has in its possession; it has, at the same time, striven to show to the world that it has preserved its wonderful traditions of hospitality, and we desire to pay it a warm tribute of gratitude and of sympathy.

Rest assured that we shall carry back with us the pleasure of so thoroughly friendly a collaboration towards the development of the sciences which are so dear to us, and that we shall inform France and our Government of all the warmth of our reception.

May I thank you also, Your Royal Highness, Your Excellency, Your Eminence, Ladies and Gentlemen, for your welcome, and for all the pleasure that you have given us, and let me associate your name with that of your beautiful country, Spain, to whom we wish the happiness and prosperity that she deserves for her qualities of work and energy and courage. (*Applause.*)

Colonel BRESSEY, *representative of Great Britain* (speaking in English) : —

Your Royal Highness, Your Excellency, Your Eminence,  
My Lord Mayor, Ladies and Gentlemen,

It is my great privilege, in the name of the British Government and of some sixty British engineers who are enjoying the generous hospitality of this ancient and royal city, to express our cordial gratitude to those who are so lavishly entertaining us with the truest Spanish courtesy.

Especially are our thanks due to the Royal family of Spain, very worthily represented by our Chairman to-day, — to the Minister of Public Works and to the Municipality of Seville whose admirable initiative and organising power are so brilliantly displayed for our benefit.

(Continuing in French) : —

Ladies and Gentlemen, perhaps there are present here a few delegates to whom French is more familiar than English. It is to them and their wives, who honour us by their presence, that I wish to express the feelings of unalterable affection that bind English road engineers to their colleagues in other lands, whom we have the honour to meet in this marvellous city of Seville. (*Applause.*)

M. ISACCO, *representative of Italy* (speaking in Italian) : —

Your Royal Highness, Your Excellency, Your Eminence,  
Ladies and Gentlemen,

If one of my colleagues on the Italian delegation, M. Luigi LUIGGI, that distinguished engineer who is so well known to most of you, had not been prevented, by an urgent and imperative duty, from attending this Congress, he would, no doubt, have repeated the happy action of the London Congress in 1913

and addressed you in the beautiful harmonious language of the country which offers us such precious and charming hospitality.

If it is not permitted to my colleagues and myself to make use of the same means of expression, we at least desire to express the same thoughts in a language that is still Latin and is sister to your own, and to address to Spain, from the bottom of our hearts, our warmest good wishes.

Many of you are aware of the fact that Italy found herself forced, by a number of difficulties that were as temporary as they were involuntary, to forgo the honour of welcoming the Fourth International Road Congress in one of her cities. The regret that this misfortune caused her representatives on the Permanent International Commission, who had asked for this honour in her name, was diminished though not effaced, when we learned that it was Spain that was to take her place : and this satisfaction had its origin not merely in the pleasant prospect offered to each of us, of visiting a country which, generally speaking, we know but little but which nevertheless is so full of attraction for us Italians; a second factor, still more potent, contributed to it : namely, the proof thus established that countries like Spain and Italy, which hitherto have been known and appreciated more particularly for their natural and artistic beauties, the picturesqueness of their countryside and their customs and the grandeur of their past, should be able and willing to take an interest and a share no less effective than other countries in the study of the essential problems of modern economic life. As for Italy, I can tell you that, owing to the peculiar configuration of a large part of her territory, she is compelled to multiply and increase her motor transport, while the improvement and development of her road system stand in the front rank of every scheme for public works and form the subject of research work upon which the most feverish activity is spent. And if, in those of our districts which are the least favoured in this respect, public administrations, and particularly the State, strive to achieve what is indispensable, in those districts, on the other hand, which are more richly endowed, we have gone far beyond what is necessary and we have striven, so to speak, to outstrip progress. I shall quote here but one example, that of Lombardy and more especially that of the district between Milan, the Lakes of Como and Varese, and Lake Maggiore, where, thanks to the bold initiative of a private company, which has had to expect from the State nothing more than purely moral assistance, the

construction is in progress, for the first time in Europe, of 50 miles of road exclusively reserved for motor traffic

I have to recognise that, with us, construction is mainly a question of finance; but we must none the less appreciate the utility of these great international Road Gatherings, for it is precisely when the question of finance makes itself felt most keenly that the knowledge of improvements effected abroad may place us in a position to reduce our expenditure or at least to use the funds at our disposal in a more judicious manner.

That is why we have considered it our duty to lend this Congress the help of all our powers and energy : if unfortunately all our Rapporteurs have not been able to respond to your appeal, you can at least read the papers which they have prepared upon each of the questions on the proposed programme. In these papers, every effort has been made to avoid expressing simply the personal ideas of their authors, but also to present, upon each question, a complete statement of the national point of view. In fact, just a year ago, at about this time, we held a large and important meeting at Naples of all the Italian Delegates, on purpose to prepare for to-day's international Congress.

That is the reason, lastly, why all of us, delegates of Italy, who have interrupted, not without difficulty, the crushing task that is imposed upon us by the restoration of our economic life, nevertheless have no remorse at having momentarily abandoned our work in order to come to Seville : for, I repeat, we are certain to get more instruction out of your intercourse than we could ever bring into it.

Hence we owe a great debt of gratitude to those who planned, patronized and organized this Congress. But, as I said at the beginning, it is to Spain in particular, to her King, to her Government and to her chivalrous and generous people that we desire, in the name of Italy and her Government, to express our gratitude here to-day. (*Applause.*)

Dr. GUGLIELMINETTI, *delegate of the Principality of Monaco* (speaking in Spanish) : —

Sire,

In the name of His Serene Highness the Prince of Monaco and the Government of the Principality, I have the honour to offer you all our best thanks for your kind invitation to this Congress.



Personally, I am enchanted at being able, on this occasion, to pay my first visit to Spain, whom we all love for her brilliant and historic past and for the greatness of her artistic wealth.

Land of poetry, land of sunshine.

We desire with all our heart that Spain may soon see the surface of her soil upon a level with the richness of her sub-soil.

I express this wish as the Officer of Health of Monte-Carlo, and as one that has devoted part of his life to the struggle against the dust of our roads by the tarring of our metalled roads, a system which has given very good results in every country and in Spain particularly upon the road between Segovia and Granja and upon the roads from San Sebastian and Bilbao.

In the name of Health, I hope that this Congress will contribute towards the progress and greatness of Spain, which I hope for with all my heart.

God save the King! (*Applause.*)

M. W. G. C. GELINCK, *first delegate of the Netherlands* (speaking in French) : —

Your Royal Highness, Your Excellency, Your Eminence,  
Ladies and Gentlemen,

In the name of the Dutch Government, I wish to offer my hearty thanks to the Royal Spanish Government, which has been so good as to bring us together in this beautiful city, so as to enable us to search out in unison the remedies to be applied to roads in decay.

In Holland, road traffic has never been very intense, thanks to the existence of numerous canals and other means of interior navigation : but the position has undergone radical transformation during the last few years, so that we find ourselves to-day face to face with the same difficulties with regard to roads as every other civilized State. Add to that the fact that in Holland the sub-soil of the districts crossed by the great arteries is marshy and, generally speaking, offers an insufficient resistance : hence the difficulties are found to be increased.

Ladies and Gentlemen, every Dutch engineer, those whom you see here as well as those who have remained in Holland, await with the keenest interest the results that are reached by this Congress : they await it with the more confidence in that we are gathered together in Andalusia, that beautiful province of Spain, and we feel ourselves bound to your country by bonds of

friendship and by a natural community of interests : I wish for no better proof than the existence of numerous shipping lines linking our ports with those of the magnificent coast of this country. (*Applause.*)

M. Richard MINCHEJMER, *Engineer, Inspector of Roads in the Ministry of Public Works, delegate of the Polish Government* (speaking in French) : —

Your Royal Highness, Your Excellency, Your Eminence,  
Ladies and Gentlemen,

I have the honour to be speaking here in the name of the Polish Government, and I do so with all the deeper emotion because it is the first time since her re-birth that Poland has taken part in one of the Road Congresses upon a footing of perfect equality with the other free nations which have already given their valuable assistance in the work of the three previous Congresses.

In our country, which has never ceased to take its part in the intellectual and scientific progress of the world, the road question appears singularly complicated as compared with the problem which presents itself in Western Europe. Thanks to the partition of Poland between three neighbouring Powers at the end of the 18th century, different sections of the same road have been subject to different forms of control, according to the political or economic system in force in each of the participating States, regardless of the needs of Polish territory taken as a whole.

This disastrous situation lasted for a century : then came the Great War, of which Poland was the scene upon the Eastern Front, and the invasion of 1920.

The war had an infortunate effect upon the state of our roads : still, despite difficulties without number, thanks to the continuous efforts of the Government and the local autonomous authorities, the state of existing roads is improving and the construction of new roads is being pursued. We do not, it is true, as yet apply modern processes such as macadamized concrete, as is done in Western Europe and North America.

For the moment, it would be a luxury for us, who have so many other and far more pressing needs to satisfy in regard to roads. Several decades are necessary for us to build up a road system that will be uniformly distributed and sufficiently close-knit

in every district of Poland; the practical and judicious solution of the road problem is thus one of the most important questions engaging the attention of our Government.

Poland, too, has always shown a lively interest in the results of the work of the Road Congresses.

As a Member of the Permanent International Association of these Congresses almost from the day after the restoration of her independence, the Government of Poland has put into practice the conclusions reached by these meetings, as is testified by the Polish road legislation of quite recent date.

That also is why my Government made a point of accepting the gracious invitation which was extended to it to send a delegate to the Fourth Road Congress, so as to come in closer contact with the distinguished gathering which would there represent the world, and draw inspiration from their brilliance.

In conclusion, may I be permitted to offer my respectful homage to their Majesties the King and Queen of Spain, and my warmest thanks to the Royal Government, to the Municipality of Seville and to the noble Spanish people, for the generous welcome which they have kindly accorded to me. It is with the most lively gratitude that I shall always remember the tokens of sympathy which have been showered upon me during my journey and during my stay in this superb and glorious country. (*Applause.*)

M. Albert D'OLIVEIRA, *delegate of Portugal* (speaking in French) : —

Your Royal Highness, Your Eminence, Your Excellency,  
Ladies and Gentlemen,

In my capacity as delegate of the Portuguese Government, I beg leave to rise during this solemn meeting to salute with all my respect, in the name of my country, all the nations represented at the Congress.

I have also the pleasant duty of bearing witness especially to the esteem and friendship which Portugal feels for Spain and for her people, to whom we are united by so many bonds based upon our happy intercourse as neighbours and upon the parenthood of our two races.

I certainly am not the man — any more than the other Portuguese delegates, who belong like myself to a country of moderate resources, and one that is poor in roads — to have the pre-

sumption to bring to this Congress any effective technical assistance as, no doubt, our colleagues will do who represent other countries where they have been in a position to keep themselves constantly in touch with the progress achieved in the art of constructing and managing modern roads.

Our part will, therefore, be confined to an attentive study of the enlightened opinions which will not fail to be expressed by men of such wide experience, assembled here from every corner of the globe to deal with questions whose importance is so great from the point of view both of civilization and of the facility and convenience of international intercourse.

Finally, I wish the best success, with all my heart, for the work of this Congress, to the President of which I offer my respect once more and to whom I pay the sincerest and most affectionate homage in the name of all my Portuguese colleagues. (*Applause.*)

M. Axel VALSINGER, *delegate of the Royal Government of Sweden* (speaking in French) : —

Your Royal Highness, Your Excellency, Your Eminence,  
Ladies and Gentlemen,

In my capacity as official delegate of the Royal Government of Sweden, I have the honour to speak before this meeting.

It is, first of all, my duty, in the name of the Swedish members of this Congress, to pay our most humble homage to the August Protector of the Fourth International Road Congress, His Majesty King ALFONSO XIII, who has deigned to become its Honorary President.

We similarly pay our respectful homage to the Members of the Royal Government of Spain, who have been so good as to grant to this Congress their eminent patronage.

Lastly, we owe our warmest thanks to the Local Organization Committee and to the Executive Committee of the Permanent International Association of Road Congresses for all the care they have taken to ensure the success of this Congress, and for the masterly fashion in which they have organized and arranged the work and the programme, a programme so complete, so interesting, and so varied, with its research work, its excursions and its receptions.

In Sweden, we are perfectly well aware of the importance and utility of the questions dealt with at this Congress.

The road, which had been relegated by the railway to a part

of secondary significance, has to-day recovered an importance of the first order, thanks to the automobile. The interest which is displayed at the present time throughout the world in the improvement of the road is increasing in harmony with the development of motor traffic. In Sweden, a considerable increase in motor traffic has already shown itself and is showing itself every day. The result is a greater, and in many cases excessive, use of our roads : they were built for a volume of traffic that bears no comparison with the traffic of to-day, and consequently the present condition of many of our roads leaves a great deal to be desired : but this fact must be ascribed, not to the technical shortcomings of the Roads and Bridges Department, but to the inadequacy of the funds at our disposal.

With us, as in the majority of countries, the balancing of a budget is a task that is not without the most serious difficulties : hence the essential question connected with the management and upkeep of our road system has become a financial one, of the highest importance. Under such conditions, our work has of necessity to be in proportion to our resources, with the result that we can only undertake paving of an economical description.

In the hope of facilitating traffic upon our roads and increasing their working capacity, we have endeavoured to standardize all our rules for road traffic, not merely as regards motor-cars, but also in respect of all road users : we have drawn our inspiration as much as possible from the resolutions adopted by the International Conference on Road Traffic, which was held in Paris in October 1921, a Conference at which I had the honour to represent my country.

The provisions of this code of rules, in which the rights and duties of each user of the road are defined, lay down the measures calculated at one and the same time to protect the roads and also to safeguard the respective rights of those who use them.

The Fourth Congress is about to open. Like its predecessors in Paris, in Brussels and in London, its object is to encourage progress in the construction and maintenance of roads, in road traffic and in the uses to which the roads are put. We Swedes are glad to lend our assistance to such a work : we hope to draw the greatest benefit from the experience of our colleagues in other lands and from the results of this assembly's work, formed as it is by the meeting of such distinguished men.

Very simply I offer a cordial salute to the Fourth International Road Congress, and in particular I salute our Spanish

colleagues, the beautiful land of Spain and this delightful city, whose reputation has made a circuit of the whole world.

I am convinced that the most complete success will crown the work of this Congress, and I have the firm hope that its deliberations will contribute towards bringing us nearer to the noble end which the International Road Congress has before it, namely the common well-being of every country and every people, for the progress of culture and civilization. (*Applause.*)

M. Gustave HERMANN, *Chief of the Roads and Bridges Section of the Ministry of Public Works, delegate of the Czechoslovakian Government* (speaking in French) : —

Your Royal Highness, Your Eminence, Mr. President,  
Ladies and Gentlemen,

The Czechoslovakian Republic has the honour for the first time to-day of taking part in the International Road Congress as a Sovereign State.

The questions of road construction and maintenance and of traffic development, which are to be discussed at this Congress, are to us of the greatest interest : the judicious transformation of our road system, which has to be effected with due regard to the configuration of our territory as well as the need for modernizing the rules for the use of public highways, occupies a dominant position among the numerous problems which our young State has to solve.

We are confident of being able to apply with success the lessons which will be drawn from the meetings held here of eminent specialists, the majority of whom have devoted their whole life to an exhaustive study of road problems.

That is why the Czechoslovakian Ministry of Public Works readily accepted the invitation to participate in the Congress and entrusted me with the pleasant duty of expressing its thanks to the Royal Government of Spain and at the same time to be its spokesman before the Bureau of the Congress in order to express the earnest hopes that its entertains for the success of the work which it has undertaken. (*Applause.*)

M. GASSET, *Minister of Fomento* (speaking in Spanish) : —

Ladies and Gentlemen,

In the name of the Government, I respectfully greet the nations represented in this gathering and I express my gratitude

to all those who have given their assistance to a work of peace, of love and of strenuous effort.

The art of oratory has greatly developed in our time: we no longer ask for long, sonorous and harmonious periods, we simply call for frankness. And since it is a question of being sincere, I cannot conceal from you the opinion that reigns commonly with regard to Congresses such as the one which has brought us together. The common man who, during the night, sees the light of an express fly past, quick as lightning, or, during the day, watches the great mirrors which reflect the rays of the sun, is often tempted to say: Here are some people of importance, they will deliver some speeches, and make some excursions, but the practical aspect of things will scarcely occupy a moments thought. That is what the working man is thinking, the carter, the small manufacturer or small trader. What they do not know is that, by discussing your methods and your ideas, by sharing your science and your experience, you are going to make it easier for the small farmer to export his produce, for the small trader to carry on his trade and for the carter to prevent his cart from sticking in the mud, as occurs so often, by providing him with a road free from obstacles. (*Applause.*)

Thank you, therefore, in the name of everyone and in the name of the Government!

The task for which you are assembled here is indeed one of capital importance: that is true for every country, but it is true to quite an exceptional degree for Spain. There is not one among you that does not know how complex is the problem of the maintenance of the roads. Countries where dampness is permanently dominant possess certain advantages over those which are subject to long periods of drought: we, in our own territory, combine the damp climate of Galice with the dry climate of Almeria; hence the question presents itself to us in all its complexity. That is why we are grateful to you for having given us the help of your science here to-day.

It would be superfluous for me to lay stress once more upon the importance of the questions which are to be submitted to you: I do not wish even to enumerate them. You know them well enough; their importance is capital: cambering on certain curves, enlargement of curves, asphalt pavements, pavements of different kinds, special pavements at traffic congestion points, lastly such and such other problems, the solution of which is vital if the modern road is to lend itself to the enormous speeds achieved to-day by the motor-car.

Let me be permitted at least to say a few words upon a subject which is — how shall I express it? — not entirely material in character, upon what might be called the soul of the road, the metaphysical element of the road. You may ask, what do I mean by that? I will reply that every great writer has compared a road, as it crosses the green country-side, to a white ribbon. Well, I should like this white ribbon to serve as a means to all those gathered in this building to come together in a brotherly embrace and bind still stronger the bonds of their affection. (*Applause.*)

Nay more : I should like to add that if so great an interest is shown by us for the manifold forms of work that you are to achieve, it is because, far more than any other nation, Spain has need of being endowed with a good road system.

I shall not speak of the engineers-in-chief of our provinces, much less of all those who have succeeded to the Ministerio di Fomento : I will only remind you that His Majesty the King makes frequent journeys by motor and makes regular trials in which his high power of intro-spection finds scope, and that he devotes himself, with all his zeal and all his enthusiasm towards developing the economic resources which are allocated in our budget to the working-out of this important and complicated problem.

And now, Gentlemen, when you take back with you into your own countries the affectionate welcome of the Spanish people I should like you to say that in the road we see, that we wish to see a symbol of peace. We should like the road with its modern pavement, its single surface, to afford a passage to lorries of merchandise, we should like this surface without a wrinkle to see motor-cars advance in which young honeymoon-couples, the emblem of love leave behind them a long trail of happiness. We wish never to see these roads that are so durable and strong, used at any time for the passage of military lorries and motor-cars carrying machine-guns that sow death. We wish the road to be the emblem of peace and of brotherhood. (*Applause.*)

As a close to these few considerations I shall first of all address an affectionate remembrance to all the nations represented here : then, I shall add that a country such as ours, whose past was so glorious but whose economic position is difficult, that a people that can claim the discovery of a world, that a people which once was very great and must surely recover its lost power, is worthy to be represented by you in your own countries as profoundly



imbued with an ideal of peace, of love and work. It must not be forgotten that to-day there is something more important to be explored than the material world; it is a moral world, the moral world of peace, the moral world in which men will not need to appeal to arms to settle their differences and their quarrels, in which the victory will lie (why could not it be so?) with the might of right and not the right of the mighty. I say that the Spanish nation bears in its soul earnest desires for peace, for love and for work.

Welcome to you. Take back with you to your homes this noble picture of the future, which Spain, by the voice of its representative, the Minister of Fomento who has had the honour of addressing you, has just unfolded before your eyes. (*Prolonged applause.*)

H. R. II. The Infante DON CARLOS : —

In the name of H. M. King ALFONSO XIII, I declare the Fourth International Road Congress officially open.

The meeting terminated at 6.20 p. m.

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MINUTES  
OF THE  
SECTIONAL MEETINGS

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FIRST SECTION  
CONSTRUCTION AND MAINTENANCE  
*(3 Meetings)*

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SECOND SECTION  
TRAFFIC AND DEVELOPMENT  
*(3 Meetings)*



**FIRST SECTION**  
**CONSTRUCTION AND MAINTENANCE,**

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**FIRST MEETING**  
**Tuesday May 8, 1923**

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**1st QUESTION**

**Surfacing of Roads with Concrete**

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*Chairman : Mr. SPITTERI, Engineer-in-Chief of the Province  
of Malaga.*

The session opened at 9.30 a. m.

**THE CHAIRMAN.** — Gentlemen, for us Spanish engineers it is a matter of great, of very great satisfaction to see the Fourth International Road Congress being held in our country. This satisfaction is carried to its highest degree inasmuch as it is also the first time that a great International Congress of Engineers has been held in Spain. Moreover, the holding of a world gathering of this importance provides us Spanish engineers with an opportunity to welcome the distinguished gentlemen who are honouring us with their presence, to bind close our friendship with them and, lastly, to offer our respectful thanks to the eminent colleagues who have come to bestow their science and their learning so lavishly upon our country. For us, in short, it is an opportunity to practise that hospitality and politeness which we are so anxious to show every time that the opportunity offers.

The importance of roads is so great that they deserve the careful thought which every country is devoting to them at the present time. This importance is not due simply to the vehicle that uses them but also to the role of first-rate importance which

the road has always played in the defence of territories, as the last world-war has amply proved. There, I repeat, is a subject which is causing pre-occupation to every nation.

It is to this circumstance that we road engineers owe the good fortune of seeing so many eminent gentlemen devoting their attention to the importance of the road, that means of communication that was the object of contempt towards the middle and even at the end of the last century. Of all means of communication it is not only the most democratic and the most economical — since everyone makes use of it, it is within the reach of all, and the use of it is entirely free of charge — but it is still the one by which the greatest speeds are attained, it is still the strategic way *par excellence* : yet, despite the immense improvements that have been introduced upon it, it is the least perfect.

I want, gentlemen, to pay homage to those who, in 1908, created the international institution of the Road Congresses. The First International Road Congress took place in Paris; and I had the honour of attending it as a delegate of Spain. The following Congresses, at Brussels and in London, in their turn also made an appeal, which arrived at a moment which was truly opportune, to attract the attention of the nations upon a point they still failed to realize, the importance of the road. This work was so praise-worthy that I consider myself bound to make reference here, not in my capacity as engineer, but as citizen, to my very great gratitude for the notable service which these Congresses have rendered to all civilized peoples. They have been a success in every respect, down to the choice of the motto adopted for our international institution : " *Via vita* ". It is impossible to express with greater perfection or with greater force the role which this means of communication may play in the wealth and life of nations.

May we all, without exception, be animated with one single thought : to make this Fourth Congress of Seville create an exceptional stir in the world, to make our conclusions at our meetings to be considered as a model, and to place our hallmark on everything that has to do with progress, with well-being, with improvement in means of communication. I have the firm hope that this programme will be realized, for I rely not merely upon the eminent gentlemen who are assembled here in these surroundings but also upon the good will which it is the duty of every one of us to bring to the task entrusted to us.

Let us discuss with heat, with energy, with spirit — it is not for nothing that we are in the land of the sun — for in that way, truth will arise before our eyes. But, at the same time, I earnestly beg of you, let us not introduce into our discussions the least sensitiveness or selfishness, for our ends, our hopes are to the last degree unselfish and impersonal.

I believe that this task will be made extremely agreeable to us by the fact that we are at Seville. Seville, city of unique enchantments, focus of the principal attractions of Spain, country which includes wonders which I cannot, I dare not enumerate, a land which her sons possess the peculiar faculty of making attractive, while the memories taken away by those that are strangers to her can never be dimmed. In all this picture of light and colour I see but one shadow : it is the rôle of Chairman which is entrusted to me, though I feel myself without either the aptitude or the qualities necessary to undertake so lofty a responsibility : so I beg of you all extreme benevolence. I believe that I shall have need of it at every moment, and that is why I ask for it with true sincerity (*Applause.*)

As for you, delegates at this Congress from other lands, I beg you to accept my warmest wishes and the assurance of my most sympathetic devotion. I have the greatest pleasure at this moment in presenting you my respects, in the name of all Spaniards. I am sure that the eminent gentlemen who make up your delegations will find an excellent reception among us. We are determined to follow your learning and your instruction. I hope, I wish it may be so. We are entirely at your disposal. We desire all of us to give you the greatest possible pleasure. I believe that we shall succeed, because we are at Seville, the queen of Andalusia, the land of colours, flowers and orange-trees. (*Prolonged applause.*)

Mr. AGUILAR, Rapporteur Général, was next called upon to speak.

Mr. AGUILAR, *Rapporteur Général.* — Gentlemen, no task could have been entrusted to me of greater difficulty than that which I am called upon to perform.

Eight reports of quite exceptional excellence have been presented on the subject of concrete surfacings, and I have been called upon to summarize them briefly. As I have already said, nothing could be more difficult, for in these essays one may look in vain for a needless word : the engineers who prepared them

know their subject through and through, and they have expounded it with the greatest conciseness. We engineers are not generally literary people : we look for nothing beyond clearness and precision. Hence, the task of condensing these essays has been an extraordinarily arduous one, and I beg all the authors of them and each one of them individually to forgive me if I have to sacrifice some ideas upon the altar of brevity.

In order to be concise, I have had to collect together all the points of similarity and to throw into relief all the points of divergence — all in a limited space. And if it was already difficult to condense essays so full of interest in order to present them in a single report, it is still more difficult to do what I am asked to do now, and make a summary of this summary. I realize that in acting thus I should run the risk of not being clear, if I were not sure that you had all read not merely the general report but also the original essays. I shall therefore confine myself to a really brief summary, for, in this respect I share the view of the Chairman and I desire to be concise.

It is in order to remain within this limited scope that I shall begin by reading to you the first conclusion, which I shall annotate with a few very brief considerations for the purpose of putting it forward for discussion.

This first conclusion may be framed as follows :—

“ 1. — The surfacing of concrete made with Portland cement, adequately proportioned and prepared with materials of good quality and suitable gradation, laid upon a substantial and well-made foundation, will, when carefully executed, be capable of resisting, in proper condition, the strains occasioned by any traffic however intense and heavy, provided the vehicles are equipped with rubber tyres ”.

I shall add nothing on the subject of this conclusion : I think that it will be generally accepted, for in all the essays presented I have not come across a single discordant note in this respect.

Concrete surfacings, in their country of origin — the United States one may truly and justly say — have been the subject of an already long period of experiment : the traffic belongs precisely to the category which has just been defined : vehicles of large dimensions with rubber tyres. There is no doubt that these pavements resist perfectly, and there is not a single report that is contradictory on this point. Cases of failure must be attributed to faults. Such is the justification for the form in which this conclusion has been framed.

I have nothing further to add, and I beg the Chairman kindly to put this conclusion forward for discussion.

THE CHAIRMAN. — The first conclusion is open for discussion.

Mr. TUR (France). — The French delegation accepts the first conclusion which has just been read, but they would like to emphasize the necessity for a good foundation and to replace the words " firm and thoroughly dry foundations " by " foundations of which the firmness and dryness are absolutely guaranteed ".

Mr. GEVAERT (Belgium). — I venture to suggest that it would be better to replace the words " are calculated to bear " by some other wording less categorical in meaning, as, for example, " are capable of bearing ".

Mr. TUR (France). — Agreed.

Mr. BRESSEY (Great Britain). — We also agree.

Mr. LONGUETEAU (France). — Does the proposed text implicitly include pre-cast concrete pavements ?

Mr. MAHLEU (France). — Yes, speaking generally, the texts proposed have, however, to avoid any allusion to commercial processes ; so that their general scope may not be infringed.

THE CHAIRMAN. — Agreement seems to me to have been reached between those of our colleagues that have taken part in the discussion of the text of the first conclusion with the slight modifications proposed by Messrs. TUR and GEVAERT. I put the conclusion to the vote.

(Adopted).

Mr. AGUILAR, *Rapporteur Général*. — Here is the text which I propose for the second conclusion :—

" 2. — In the traffic conditions set forth in conclusion 1, such pavements afford great stability, and are fit for any climate. As they are smooth and not slippery, they offer but little resistance to rolling and traction. Their duration is considerable the cost of upkeep being reduced ; when worn to a certain extent they can serve as foundation for other types of surfacings and be regenerated with fresh concrete. They are neat, not too dusty, and permit of easy evacuation of water. The necessary constituents can be got almost everywhere and the construction



is simple. They are clearly visible during the night, and do not cause noisy rolling of the vehicles, at the same time reducing waste and wear of the tyres and springs.

" On the other hand, they entail considerable first cost, difficulty of repair when deeply worn utmost care in execution, to which the most minute attention must be paid all through the duration of the work, which causes traffic to be stopped a fairly long time; they do not permit of easily opening trenches or the like, and are unsightly when flawed with numerous cracks ".

THE CHAIRMAN. -- The second conclusion of the first Question is open for discussion.

MR. TILR. -- We propose some amendments to this conclusion, of which the wording has been circulated to you. These amendments relate mainly to the life of the roads, the cost of upkeep and the facility of construction or making repairs.

We should prefer not to retain the words " They last a long time " because we do not know what length of time that may mean; the experiments which have been made cover too short a time for us to be able to express an opinion in this connection. That is why we would rather not express any conclusion.

Then I read, in the text of the general report, the following words " Construction is easy ". It seemed to us that this was too strong, and we think that from the point of view of construction, there are some considerations which are very special and often trying; hence, we think that this phrase should be omitted, and similarly the conclusion relating to the expense of upkeep, " Cost of upkeep is infinitesimal ", for we have not sufficiently definite information on this subject.

A DELEGATE. -- In fact, we know nothing. Expenses at the present time are slight, but there is nothing to say that, later on, they will not be higher. Hence I see no objection, for my part, to this statement being suppressed.

MR. GEVAERT. -- Gentlemen, I should like to draw your attention to the following point which is mentioned in the text of the General Report and is repeated as follows in the amendment proposed by the French delegation, " It is not easy to open trenches. Repairs, in the event of considerable deterio-

ration, are fairly difficult ". These are objections which are often made, especially in regard to concrete surfacings.

I must say that in Belgium, as in France, we have mechanical means by which the demolition of concrete is very easy. Repairs can be made very quickly and in very short time; and they can be made extremely well, with appropriate tools. Hence I believe that concrete monoliths are, on the contrary, relatively easy to repair as compared with other pavements.

Consequently, I consider that it would be better to omit the words, " Repairs are comparatively difficult ".

Mr. MATHIEU. — I believe, Gentlemen, that all the same we cannot say that repairs are easy. The use of mechanical means is certainly easy for the demolition of concrete, but we must know the price. Consequently, when we say that repairs are fairly difficult, it is not of the execution that we are speaking but we mean that repairs are not easily made owing to the expenses involved. We are speaking from the financial point of view, and we are not alluding to means of a technical description.

I believe that it would be better to refrain from too absolute an interpretation. When the amendment says " fairly difficult " that does not mean " impossible ".

Mr. AGUILAR. — The French Delegation is, in principle, in agreement with me; there is scarcely any divergence of view except on details, due to the fact that the French Delegation does not feel itself supported by sufficiently long experience on certain points.

Whether " the life of concrete surfacings " is long or not is simply a matter of experience and of experience alone. The very able American report tells us that certain surfacings of this character which bear traffic with rubber-tyred wheels have had a life of 20 years. It is the experience of America which serves as the basis for this conclusion; it is not I that support it: in Spain the oldest road surfacing is not eight years old.

" Construction is easy ". It is probable that, as regards construction, the word in France has not exactly the same meaning as in Spain. We say that construction is easy when we mean that it does not require the use of special appliances. Concreting and the whole operation can be carried out by hand, and they only require the employment of a very limited number of workmen. It may be more convenient to carry them out

under different conditions, but for us, the possibility of carrying them out as I have just described constitutes easiness in a very real degree. When we say that construction is easy, we profess only to have in mind the actual preparation of concrete, and that alone; for, if that were not so, there is another word that we should use in Spanish. One fault, to which I draw attention in the conclusion, lies in the necessity involved for diverting the traffic and, if that fact is to be included in the word "construction" I see no objection to saying that construction is not a simple matter, but is, on the contrary, difficult; but, once again, we are only considering two points: the need for special knowledge and the necessity of employing a special staff. That being so, if the Congress considers that the word "construction" can include all the various elements which I have just mentioned, there would perhaps be grounds for suppressing the word. If by "construction" we mean the complete putting into execution from first to last of a proceeding which involves a diversion of the traffic, it must be agreed that it would cause extraordinary difficulties which may render it impossible.

As regards the moderate cost of upkeep, I will repeat what I have explained with regard to the life of the road: it is simply a question of experience in America. The question is dealt with in five reports which all agree in stating costs of upkeep are low. It was my duty, as Rapporteur General, to summarize these views; besides, I have come across no view to the contrary. That is how I was led to the conclusion that costs of upkeep are insignificant.

I should be in agreement with the French Delegation in omitting the conclusion that *surfacing cost a lot of money*, all the more because it is possible to contemplate the hope of seeing their cost price diminish.

Mr. MAHIEU. - - Gentlemen, I should like to make an observation of a general character. The conclusions which are submitted to us are very long, and so are the amendments. It is clear that it is very difficult for a number of delegates to follow the discussion of them in all their details. In these circumstances, it would be preferable to confine ourselves to discussing the ideas without entering into details of wording, and to entrust to a Drafting Committee the work of preparing a final text. This Committee could meet after the meeting; it could hear any delegates with observations to make, as circum-

stances may require. Once the text has been determined in accordance with the ideas adopted by the meeting, it could be put forward for the approval of the Plenary Session at the close of the Congress. In this way, definite conclusions could be proposed to you on Saturday which would meet with general approval. (*Hear, hear.*)

THE CHAIRMAN. — The method proposed by Mr. MAHIEU seems to meet with general approval, so it shall be followed. The exchange of views which has just taken place with regard to the first two conclusions will enable the Drafting Committee to prepare a final text for them. We will now pass on to the third conclusion.

MR. AGUILAR. — Here is the text which I propose for the third conclusion :—

“ 3. — The tests carried out on public ways where most vehicles are of a heavy type and are provided with metal tyres have led to a very encouraging result, but it will be necessary to-further study the means of securing such running surfaces as would offer more effective resistance to attrition ”.

I should mention, first of all, that I have given conclusions which are absolutely distinct, according as it is a question of the action of rubber tyres or of metallic tyres. With regard to the former, the conclusion may be regarded as final; it is a fact that concrete surfacings offer a perfect resistance to any traffic of this description. The latter, on the contrary, give rise to numerous discussions. There are surfacings in existence (such as the surfacing which was constructed not far from here and which we shall be able to see) which are used by vehicles shod with metallic tyres; they have only recently been finished and they are wearing well. I know other examples of surfacings where the damage is slight, but no statement can be made in this connection because certain reports submitted to this Congress mention cases where the surfacings have not been able to bear this class of traffic. To such an extent is this true that at the present moment, the prohibition of metallic tyres is being seriously contemplated. With us, as in France, the traffic is mainly heavy traffic with metallic tyres; hence there appears to be considerable scepticism upon the point which we are considering.

If there were not many facts pointing in favour of the third

conclusion, I should certainly have drafted it in a more pessimistic sense; but it seemed to me logical to leave the door open to hope. That is why I have given a general character to my wording, and have confined myself to stating that the question here is one which must be followed up further. That is the sense in which I propose to the Congress to consider this conclusion.

Mr. TUR. — I make the most specific reserves regarding the third conclusion, in the form in which it is presented by the General Reporter.

Results obtained on highways where a large proportion of the heavy vehicles are provided with metallic tyres vary very considerably according to circumstances. It seems at present that these results do not constitute a sufficient experiment for us to be justified in basing a forecast of the future upon them. We should therefore prefer to see this conclusion purely and simply omitted; still we would agree to maintain it, but only in an extremely doubtful form.

Mr. BRESSEY. — The French Delegation offers some reserves on the contents of the General Reporter's third conclusion. For myself, I do not think that the experience gained up to the present justifies a definite pronouncement.

Mr. MAHIEU. — We should be agreeable to saying, "The tests effected are to be continued". But I should prefer to omit the third conclusion, and Mr. AGUILAR raises no objection.

Mr. BARRIOS (Spain). — I desire, Gentlemen, to tell you of an experiment which evidently has not been of long duration, since it only embraces a period of twenty months but could not have given more satisfactory results. The test to which I refer has been carried out with the aid of certain cements which I call "screened"; no wear has shown itself; the surface of the pavement remains intact. The fundamental principle applied in the construction of this pavement is no different from that which governs the execution of all road works. In such works one always aims at placing the elements which are exposed to wear, under particularly good conditions of resistance, suitable to the strain which they are required to bear. Applying this principle to concrete pavements, I adopted two coats, or three, according to the nature of the ground, so as to effect the maximum economy, exactly as for other works; I employed

common quartz, which offers the greatest resistance and length of life, in the form of rounded gravel, that is to say, without any kind of preparation, so as to reduce expenses simply to those of transport. The cost per square metre (1) in this process varies from 10 to 16 pesetas.

As I mentioned just now, no trace of wear is to be seen.

Mr. AGUILAR. — I recognize that it would be well to draft the third conclusion, in its final form, in some other way. We might omit the words " very encouraging " and lay special emphasis upon the words " the tests must be continued ". It will be for the Drafting Committee to draw up the final text. (*Hear, hear.*) .

THE CHAIRMAN. — We will now pass to the fourth conclusion.

Mr. AGUILAR. — Here is the text :—

" 4. — The materials for preparing the concrete must be chosen with great care.

" The water must be clean, and free of any oily, alkaline or organic constituents.

" The Portland cement to be of superior quality.

" The fine aggregate is preferably sand, which must be free of slime and of organic substances, only a small proportion of clay being admissible; one should avoid a proportion of fine granulation (under 0.5 m/m) (2) exceeding 30 per cent, as also the presence, even to a little amount, of grains under 0.2 m/m. (3). The resistance to tension and compression of mortars proportioned at the rate of  $1 \times 3$  should not be inferior to that generally obtained with samples of mortar containing normal sand of same proportions.

" The coarse aggregate may be rounded pebble, slag or broken stone, this latter to be preferred. The materials forming the coarse aggregate must be tough, and capable of resisting wear due to attrition ".

Mr. TUR. — In principle, we are in agreement with the Rapporteur General, but we consider that it would be desirable to speak not only of Portland cement, which is universally known, but also of the special cements which are at present in process

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(1) 1.193 sq. yds.

(2) 0.02 inch.

(3) 0.008 inch.

of manufacture and of actual trial in many parts of Europe and the world : we might add that " special cements " may also be employed.

Mr. Ch. NICOLAS (France). — In this connection, Gentlemen, allow me to say a few words upon the use of quick setting cement upon concrete roads.

This product, called *ciment fondu* or *electrofondu*, in France, " Lafarge cement " in Scandinavian countries, or Lafarge aluminous, or " vitrified cement " in England, was invented and perfected by the Société des Chaux et Ciments de Lafarge et du Teil, which at present produces about 25,000 tons a year.

It is the resultant of the fusion of a mixture of bauxite and pure lime-stone produced in the water-jacket or electric furnace : its principal constituent appears to be aluminate of monocalcic lime, and it is remarkable for its total absence of free lime.

Among its properties, I will simply mention its high powers of resistance and in particular, its extra-rapid hardening.

In a mortar of 1 : 3 (1 part of cement, 3 parts of sand), it often gives, after 2 or 3 days, a resistance to tension of 35 kilos p. sq. centimetre (1), more than the best artificial cement after 3 months.

In compression the same proportions are maintained; a resistance to crushing of 350 kilos p. sq. centimetre (2) is often obtained on a cube of 20 centimetres (3), with a concrete made of 300 kilos (4) of alumina cement, 400 litres of Seine sand and 800 litres of gravel (5).

This property of rapid hardening is valuable in a number of cases for concrete roads : it makes it possible to meet one of the principal objections to this surfacing, namely the necessity of putting the road out of service for three or four weeks.

Mr. AGUILAR. — I raise no objection to the insertion in the conclusion of some reference to special cements, especially as these cements are used in Spain even by the distinguished engineer who addressed you just now, Mr. BARRIOS.

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(1) 500 lb. p. square inch.

(2) 5 000 lb. p. square inch.

(3) 8 inch.

(4) 600 lb.

(5) 87.5 gallons and 175 gallons.

Mr. TUR. — I also ask for the omission of the words " Materials forming the coarse aggregate must be tough and must resist wear by friction ".

Mr. AGUILAR. — I have no objection.

Mr. BRESSEY. — In general terms, the British Delegation agrees with the resolution of the French Delegation not to exclude other cements than Portland from the resolution and to omit the last phrase of the conclusion in the General Report regarding materials of coarse grade.

Mr. GEVAERT (Belgium). — I have only one word to say. In the conclusion in the General Report I read the figure 30 % : I do not know how this figure was arrived at, but I venture to say that experience affords no grounds for adopting such a figure.

Mr. F. NICOLAS (France). — This figure has been omitted in the French Delegation's text.

Mr. GEVAERT. — In addition, I would mention the desirability of making sand concretes.

In the reports of the American delegates I observed that bad results were obtained with quarry sands. By using fine aggregates of dust, porphyry and granite a gain of 60-70 % has been obtained as compared with a mortar of natural or river sand. That is a result which must not be neglected, because it shows that very suitable results may be obtained with very fine materials.

Mr. TUR. — The French wording might be both simplified and also generalized. Every country uses a method suitable to its resources, and so we might adopt quite general terms. Some people will obtain satisfactory results with pavements composed of mediocre materials.

Mr. VARVIER (France). — The Rapporteur General agrees to omit the word Portland, and to keep the phrase relating to the quality of the cement. Moreover, the third paragraph might be worded as follows, in order to satisfy the observations made by Messrs. TUR and GEVAERT :—

" The fine aggregate must be freed of all slime and organic matter, and only a small proportion of clay must be allowed : too great a proportion of fine grains will be avoided ".



In this way we should omit the details given with regard to the mixtures and resistances which appeared too special to certain of our colleagues.

Mr. BRESSEY. — I have no objection.

THE CHAIRMAN. — The General Reporter raises no opposition.

The fourth conclusion will therefore be adopted under the conditions which have just been discussed.

We will now pass to the fifth conclusion.

Mr. AGUILAR. — Here is the text :—

" 5. -- It is of utmost importance that the concrete should be as compact as possible. As a first approximation, and as a minimum degree of concentration one may take  $1 \times 2 \times 3 \frac{1}{2}$  in volume or the equivalent, namely, 400 kilos (1) of cement to 510 litres (2) of fine aggregate and 945 litres (3) of coarse aggregate. In each case experiments should be effected with the materials at hand in order that such proportions as will produce the greatest density may be secured.

" If the concrete is to be executed in two layers, the lower one can be of a poorer mixture ".

Mr. TUR. — I have one observation to make upon this conclusion. The proportions indicated refer in reality to the case of Portland cement. For special cements, different proportions may be adopted.

Mr. BRESSEY repeated M. TUR's observation in English and expressed his agreement with it.

Mr. GEVAERT. — I should like to make a short remark with regard to the last phrase of the conclusion.

It is clear that if the soil is assumed to be sufficiently solid, the lower layer may be less capable of resistance, but it is not a good thing to construct lower layers which are less capable of resistance than the upper layers. It is in the lower part of the concrete the greatest tendency to expansion exists and, under these conditions, the lower concrete must be very resisting. I think it would be better to omit the last phrase.

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(1) 850 lbs.

(2) 118 8 gallons.

(3) 209 gallons.

Mr. BRESSEY. — Perhaps you are right. However, the idea that the lower layer of concrete can be poorer rests upon the supposition that the lower layer suffers less from the traffic.

Mr. E. NICOLAS. — I think that this supposition determines the whole question. The lower coat can be thicker, the upper one has to be richer in order to resist the direct action of the vehicles.

THE CHAIRMAN. — No one else wishes to speak upon the fifth conclusion, which will be polished up by the Drafting Committee.

We will pass to the sixth conclusion.

Mr. AGUILAR. — Here is the text :—

" 6. — The foundation must be stabilised and strengthened with the utmost care. Drains must be laid below the depth at which the ground can suffer from frost: and should the latter be of considerable intensity, it would be advisable to take extra measures, and have the concrete resting on materials which are bad conductors of heat, such as coke, cinders, pulverised peat, etc. ".

Mr. TUR. — The French Delegation is entirely in agreement with the Rapporteur Général upon this conclusion.

Mr. BRESSEY. -- We make no objection to it either.

Mr. GEVAERT. — In my opinion, it would be preferable to omit the sixth conclusion.

Mr. MAHIEU. — I do not share this opinion, for the sixth conclusion draws attention to a necessary and very important precaution : hence it is very useful.

Mr. DAHLBERG (Sweden). -- I have not sufficient time here to deal more in detail with this special question, which I have dealt with in my report (which bears n° 8). But the drafting of the sixth conclusion leads me to ask for a few slight modifications.

In the last sentence of the conclusion in question we read : Drains must be laid below the level to which frost may penetrate. The depth of the drains does not depend only upon the frost but also upon the nature of the ground and the amount of water. That is why I have the honour to propose the following text " With regard to the laying of drains in deter-

mining the level, due consideration must be paid to the nature of the ground, the amount of water and the frost.

Now I come to the second point in the text in question. When the climate is liable to very severe frosts, it is well to complete this precaution by placing under the surface layers of matters which are bad conductors of heat, such as coke cinders, peat, etc.

In reference to my report and in completion of it, I venture to draw the attention of my colleagues once more to the secondary phenomenon of frost, which consists in the fact that the humidity of a layer of ground may be very considerably increased under the influence of frost. This phenomenon, in my opinion, is one of the main causes of the deterioration which is to be seen on all sides in roads and streets, in winter and in the spring, and not merely for surfacings in concrete but generally for all kinds of surfacing.

According to experiments which have been carried out in Sweden by the State Geological Research and are corroborated by similar experiments in America, it has been established beyond discussion that in a layer of damp ground the degree of humidity is considerably increased in portions in which the action of frost is felt. It has similarly been proved that, for ground of special character, loamy or finely granulated, this increase in humidity may reach a point — the critical point — at which the resistance of the sub-soil falls to zero or the neighbourhood of zero.

This phenomenon may occur under road surfacings without any great depth of frost. A few centimetres only are sufficient for a liquid or almost liquid layer to form below the surfacing. If a heavy vehicle then passes over it, the complete collapse of part of the surfacing may quite well follow as a result. I do not think there can be any question as to the possibility of events of this sort upon roads.

In any case, if the conditions which I have mentioned above coincide, it will naturally be *very important to avoid ground of such a dangerous character*. If that is impossible, it would still be necessary, in such places, to put below the surfacing layers of matters which are bad conductors of heat and moisture. That is why I propose, Gentlemen, that the text be modified in the following way " *When the ground on which the surfacing rests is of a kind to be considerably affected by moisture and frost, it is useful to place below the surfacing layers of matters*

*which are bad conductors of heat and frost, such as coke cinders, pulverised peat, etc...* ”.

Lastly, I am of the same opinion as the French Delegation : it is very important to continue research for means of preventing the formation of cracks due to contraction or to variations of temperature or, at least, to restrict their magnitude. I think that it would be extremely useful for the results of experiments carried out in different countries to be collected in the interests of the engineers who are concerned with roads. I may add that the Association of Swedish Engineers of Stockholm presented some proposals at a meeting dealing specially with roads which were aimed at instituting experiments on the action of water and frost upon roads.

Mr. BRESSEY. — The Drafting Committee might take account of the interesting remarks made by Mr. DAHLBERG.

THE CHAIRMAN. — This shall be done. We will now pass to conclusion n° 7. The text of conclusion n° 7 which was read by the Rapporteur Général, was adopted without discussion.

The same was the case with conclusion n° 8.

THE CHAIRMAN. — Let us pass to conclusion n° 9.

Mr. AGUILAR. — Here is the text :—

“ 9. — Generally speaking, it is not advisable to have the concrete executed in two layers; at any rate, when carried out in that way, one should provide, at least, for having the second one laid down before the first one has commenced setting, and for consolidating the whole at one and the same time ”.

Mr. BUIJS (Belgium). — Gentlemen, the table attached to the report of Messrs. CLAEYS, GOORIECKS and MUILEN on concrete road surfacings refers, among other things, to the work carried out between 1913 and 1921 under the supervision of the Technical Department of the City of Antwerp, to which I have the honour to belong.

In all the concrete surfacings which we constructed up to 1921, cracks have occurred, in spite of the precautions we have taken in certain particular cases to arrange transverse joints for expansion at short distance from one another.

I attribute this phenomenon to the mistaken manner in which attempts have been made to deal with the question of the changes in volume which show themselves in a monolithic road.

Whatever the cause may be, changes in volume must be allowed to operate without restraint if the formation of cracks is to be avoided.

The surfacing of a road, like a metal bridge-truss, must be able to expand and contract freely under the influence of changes in temperature or of internal forces produced by the setting of the cement. Hence it is necessary to make the surface quite independent of the foundation, the kerbs, the sewer-openings, the drainage traps and other obstacles which might offer resistance to this movement.

Starting from this principle, we constructed, during June and July 1922, a surfacing of rich concrete in the central track of the Avenue Henriette which is situated in the centre of the city of Antwerp. This track is reserved for light wheel-traffic and motors with pneumatic tyres.

From the existing macadam, which was 6 inches thick, a layer of 3 in. of broken stones was removed. The remainder was consolidated by a roller weighing 16 tons and shaped with a layer of cement having an average thickness of 3 cm. (1) and consisting of 300 kilogrammes (2) of artificial Portland cement per cubic metre of concrete.

The foundation thus prepared was carefully rolled and covered with a dressing of potter's earth to prevent the surfacing of the road sticking to it.

The idea of making use of potter's earth was suggested to me by one of my road foremen, a sculptor in his hours of leisure, who used this material for modelling.

The layer of cement which constitutes the surfacing of the road is 5 cm. (3) thick and comprises 400 kilogrammes (4) of artificial Portland cement per cubic metre of concrete.

Provision has been made for longitudinal expansion joints on each side of the road along the kerbs and transverse joints at distances varying from 35 to 40 feet and corresponding to any obstacles which might impede the free expansion of the cement, such as manholes, gully-grates, etc...

The sections of roads between two transverse joints could be executed in one day. The expansion joints thus also formed joints for resuming the work.

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(1) 1.18 inch.

(2) 662 lbs.

(3) 2 inches.

(4) 882 lbs.

For filling in the longitudinal joints we used clay, while the transverse joints were filled in with different bituminous materials, such as mixtures in varying proportions of bitumen and mastic, of asphalte cement and "flux".

The area of the surfacing which has been carried out is, approximately 1100 yards square, and the work cost 17 francs the square metre (1).

Last winter 37 days of frost were recorded at Antwerp, the temperature varying from 30° to 17° Fahrenheit. The concrete has shown no cracks worth mentioning.

The movement of expansion and contraction is distinctly visible by the form taken by the upper surface of the bituminous matter which fills in the transverse joints.

Among the filling processes put into practice, the one which makes use of the flux seems to give the best results : it keeps its elasticity in cold weather and sticks to the concrete.

It would be premature, Gentlemen, to draw any definite conclusions from the results obtained only a few months after the completion of the work. But I thought it would be interesting to make you acquainted with the process which we have followed, a process based upon considerations which have, I think, been lost sight of hitherto, especially as regards the power of the upper layer to move freely on its foundation.

THE CHAIRMAN. — The Drafting Committee will consider to what extent it can take account of the remarks which have just been made. Subject to this observation, the 9th conclusion is adopted.

Let us pass to conclusion n° 10.

Mr. AGUILAR. — Here is the text :—

" 10. — The advantage of utilising machinery must be studied in every case for the sake of economy. At it is very essential, to secure high resisting power of the concrete, to employ a small quantity of water, it is advisable that the final operations of smoothing, tamping and compressing with the roller be mechanically effected whenever possible. It is likewise advisable, in order to secure uniformity of mixtures, to make use of concrete mixers provided with such devices as will render constant the quantity of water as also the duration of the mixing ".

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(1) 1.100 sq. yds.

Mr. TUR. — For the 10th conclusion, I suggest adding that the proportions of water advisable should form the object of methodical study.

Mr. BRESSEY. — I second this proposal.

THE CHAIRMAN. — In accordance with what is agreed, if there is no opposition, the conclusion, with this addition, will be adopted. We will now pass to the 11th conclusion.

Mr. AGUILAR. — Here is the text :—

" 11. — It does not seem advisable as yet, to pronounce a preference for either reinforced or ordinary concrete; in the meanwhile one should further proceed with study and experimental work concerning so interesting a matter "

Mr. BRESSEY. — The English-speaking delegates have no objections to offer.

THE CHAIRMAN. — Adopted. Let us pass to the 12th conclusion.

Mr. AGUILAR. — There is the text :—

" 12. — Formation of cracks seems to be unavoidable in this kind of surfacing; at least, it has not been possible to avoid them entirely, either by provision of special joints or by utilisation of special materials "

Mr. TUR. — We propose to combine conclusions n° 12 and 13 of the Rapporteur General in a single draft, for the 13th deals with expansion joints. We might say this :—

" Researches should be continued with a view to finding the means of preventing the formation of cracks due to contraction or to variations of temperature, or at any rate to limiting their importance.

" The utility of providing expansion joints when the concrete is exposed to considerable variations of temperature must be studied in each case.

" As a matter of fact each joint constitutes a weak spot in the surfacing and may be the starting point of rapid disintegration.

" The material with which the joint is filled should also form the object of a special study "

Mr. BRESSEY. — The British delegates would prefer to leave the two paragraphs separate.

M GENARD (Belgium). — I propose that the French draft be adopted, as being the clearest.

Mr. AGUILAR. — The French Delegation have expressed the opinion that the study of the problem of the formation of cracks must be continued. I said that it appeared to me impossible to avoid them for I did not find in any of the reports the statement that they did not occur; there has never been any surfacing in the world where no crack of any kind has appeared. Hence, the means used to avoid their formation are innumerable, to such an extent that it appears that all the resources of ingenuity have been exhausted. However, there is no objection to asking for the study to be continued, since there has never been any reason either for us to give up in despair; although my personal opinion is decidedly that it would be very difficult to arrive at any result. The French Delegation lays particular emphasis upon the fact that the joints form the weak spot. There is, in fact, no doubt about that, and particular emphasis was laid upon it in the General Report, to such an extent that a number of engineers are in favour of purely and simply eliminating any sort of joint in surfacings. In any case, I think there is one point that can be provided for, and that is the expansion joint at distances of 60, 70, or 80 metres (1), as the case may be, so as to avoid any accident that might occur through the effect of expansion. The American report gives a detailed description of accidents due to this cause.

Conclusion n° 13 has been drafted in a very vague form, since it states that, to avoid accidents caused in concrete roads by expansion due to high temperatures or an excess of moisture, expansion joints may be made.

Hence I should be glad to see the conclusion adopted as it stands, though I readily agree to insert in the previous conclusion that investigation must be continued with a view to avoiding the formation of cracks.

Mr. MAHIEU. — The French version, when amended in the way just indicated by Mr. AGUILAR seems to me acceptable; the Drafting Committee will polish up the wording.

THE CHAIRMAN. — Any opposition? Adopted.

We will pass to conclusion n° 14, which is the last proposed by the Rapporteur General.

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(1) 65, 70, 87 yards.



Mr. AGUILAR. — Here is the text :—

“ 14. — All study and experimental work or tests effected in order to secure economical results in this class of surfacing are interesting, when the roads have to bear traffic consisting of vehicles of average or small weight ”.

Although you have all read the reports presented, I want to explain to you why I formulated this conclusion. It has to do in particular with some very interesting experiments made in France and Belgium, based upon the use of hydraulic lime. The surfacings thus obtained work out much cheaper than those which make use of Portland or special cements.

As regards the results, there is some difference of opinion : in Belgium, the *Cornet* system was, at first tried with great success, but it seems that this system does not now enjoy the same amount of favour as in the past.

In France similarly, some very interesting experiments have been made by the use of these matrices in different forms. None of these experiments is finally completed, but I think that we must proceed further along this path, for we are here dealing with processes which might give good results for roads with a small amount of traffic, though naturally not for roads with heavy traffic, where the essential difficulty would be the wear and tear, which would always be more serious for the matrix than for the stone.

It was for that reason that I thought it desirable to leave this point more or less undecided, without defining the procedure, and simply saying that we should proceed further along this path.

Mr. TUR. — We think it would be a good thing to replace the conclusion proposed in a very general way by Mr. AGUILAR by a text referring specifically to the experiments undertaken for the purpose of incorporating a lime or cement matrix with plain macadam. We have there some processes which ought to form the subject of further experiment.

We propose the following text :—

Apart from actual concrete roadways, interesting results have been attained by adding to a macadam surface, either during or after construction, a lime or cement mortar as binder.

“ Though slightly dearer than ordinary waterbound macadam, this offers the advantage of keeping its original regular surface

longer than the latter; the increase of life compensates the increase in expense, and this to the profit and ease of the traffic.

" Trials of this process, completed by surface tarring and maintenance by using tar or asphalt, are to be recommended for roads with average traffic for which for the moment there can be no question of considering the use of concrete ".

Mr. BRESSEY. — The French draft is more elaborate and precise than the wording of the Rapporteur General. In England we have but few experimental data upon the method of road construction described by Mr. TURN, and it is difficult for us to formulate an opinion which is supported by the facts.

THE CHAIRMAN. — There is nothing to prevent these two drafts being reconciled. If you agree, that shall be the role of the Drafting Committee. (*Hear, hear.*)

We have now completed our programme, but our colleague Mr. W. W. CROSBY, who has been detained hitherto with the Second Section, wishes to make a statement. I call upon him to address the meeting.

Mr. W. W. CROSBY (United States) :—

For some years the speaker has been urging that the truths in the matter of the proper proportioning of Cement-Concrete for highway purposes be formulated and disseminated throughout the Profession.

There is ample evidence from the experiences of the past that mixtures lean in cement will be most efficient in a multitude of cases. Our increasing knowledge concerning the laws of density for mixtures of mineral aggregates supports, explains and develops the theories suggested by the experience of years.

But in the United States, " the Truth, the whole Truth, and nothing but the Truth " has not been desired by certain interests, and only partial truths — almost worse than untruths in their misleading abilities — have been developed and broadcast by those best qualified and equipped for discovering, expanding, and publishing the facts. Apparently the course chosen was dictated by the desire for immediate cash returns rather than by any wish for a complete exposition of the truth and a reliance upon greater ultimate benefit by everyone including the cement interests themselves.

To European Highway Engineers and others who now are, relatively speaking, at least in comparison with their American

brothers, just at the beginning of cement roadway construction, the speaker offers a word of warning :—

Do not accept as conclusive any statements to the effect that " 1 : 2 : 4 ", or similarly rich mixtures, have become the generally accepted standards in the United States.

While there are numerous localities in which rich mixtures are favored, the reasons therefor may be found to be other than scientific. Nature is always quite ready to believe that if one teaspoonful of medicine is good for a trouble, two will do better.

The speaker believes, regretfully, that if, in the United States, the same amount of energy, funds, and time had been expended in developing all the facts concerning the use of cement in highway work that has been publicly shown toward the excessive use of cement in the mixtures for the surfacings, we would all be better off now.

That the use of an excessive amount of cement is not only unscientific but also harmful to the results as well as uneconomical can be readily proved. Those who wish details of the speaker's ideas in the matter are referred to the Cement-Concrete Section of " The American Highway Engineer's Handbook ".

THE CHAIRMAN. — We thank Mr. Crosby for his interesting statement which will be incorporated in the Official Proceedings.

MR. GENARD. — I think I am the interpreter of the feelings of every one of the delegates here present, when I congratulate Mr. AGUILAR, the Rapporteur General, upon his learned and brilliant work and also when I express to the General Secretary the warmest feelings of gratitude of the whole Congress. Our gratitude to our Chairman Mr. SPITERS, is all the greater because he has been able to preside over our work with the most distinguished members of this Congress.

THE CHAIRMAN. — Gentlemen, after the interesting discussion which has just come to an end, it only remains for me to offer my most sincere thanks to all who have taken part in this debate and to assure them of my very great gratitude for the interest which they have been able to give to it, thanks to their work, their knowledge and the scope of their practical experience, and to tender to you all my respectful greetings.

Gentlemen, the meeting is at an end. (*Long and vigorous applause.*)

(12,30 p. m.).

FIRST SECTION  
CONSTRUCTION AND MAINTENANCE

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SECOND MEETING

Wednesday May 9, 1923

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2nd QUESTION

**Use of Bitumen and Asphalt for surfacing**

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*Chairman* : Mr. SPITERI.

The meeting opened at 9.45 a. m.

THE CHAIRMAN. — The Reporter General will speak.<sup>1</sup>

Mr. J. M. SAINZ, *Reporter General*. — Gentlemen, speaking before this pleiad of eminent personalities who have submitted such remarkable Reports, the fruit of fertile experience, I think I must claim your indulgence.

The memoranda submitted merit special felicitation and, on behalf of the Spanish engineers, I congratulate their authors from this tribune.

You know the subject which these memoranda treat and I beg to summarize them. Already in the second Congress (Brussels 1910) Mr. LE GAVRIAN showed that the use of asphalt and bituminous binders in the pavements, would lead to very interesting investigations and that one might hope they would conduct us to intermediate dressings between the tarred dressings (inexpensive, but not very good for dense traffic), and costly stone pavements and that they consequently would constitute an important progress. Facts confirm the prediction of Mr. LE GAVRIAN.

The engineers, in order to cope with the effects of the new means of locomotion, and rejecting high-cost pavements, which are only applicable for very heavy traffic, have recourse to the construction of roads with binders mixed with stone.

All the reports confirm the conclusions of the Congresses of Brussels and London; as these methods are costly, it is of importance that the subsoil be well dried and have a solid foundation.

It is impossible to make a summary in so short a time of the materials which this important question embraces. I therefore shall restrict myself to the most essential points.

France presents a method of a single coat work that experience proved successful.

You will have seen in the interesting memoranda which some engineers of England, Canada and the United States submit us, that experience has proved the two-coat work like the single layer process to be very adequate.

Moreover, the technique of the preliminary proceedings, fabrication and use of the materials appears to be fixed. This is also the case with the specification of the ingredients which compose the mixtures. But we cannot say this for the determination of the quantity, as it is not easy to adopt a formula with a unique solution; each case depends on local conditions or climate and nature of the traffic.

We may conclude from the memoranda submitted that the use of certain bituminous or asphaltic mixtures which contain homogeneous material and where the water is replaced, as a binder by liquids or mineral matter of a greater agglomerating power, allows the construction of stronger and more elastic roads, more resisting to the destructive effects as well of the natural elements as of any kind of vehicle.

In order to construct strong, lasting and compact pavements, careful selection of the materials, scrupulous execution and constant inspection are absolutely essential: generally speaking, the work should be entrusted to well established contractors.

As to asphaltic dressings the advantages are doubtless numerous: the even surface; smooth, elastic; little noise, without dust and mud, uniform and slow wear and as to the effects of vibration pavements made in this way are at least as advantageous as wooden pavements.

**Maintenance.** — Repair in due time is recommended, as every delay causes rapid deterioration.

**Specifications.** — As regards cement, at present the contracts stipulate exactly its physical and chemical qualities, etc.; unfortunately this is not the case with the aggregates and mixtures.

**Contracts.** — The following particulars should be specified for the mixture :—

The percentage of bitumen soluble in carbon bisulphide.

The percentage of insoluble organic matter.

Specific gravity.

Penetration.

Melting point.

Type of aggregate, its grading, with particular reference to the percentage of filler in the aggregate.

The Spanish engineer, Mr. SORRIBAS, in his memorandum concerning modern processes for paving roads finishes his memorandum with a contract for the repairing of the dressings which we can consider as a model.

**Tests.** — In repairs of some importance, the contracting party must erect a laboratory with the necessary elements and apparatus for verifying the proofs of the materials and mixtures.

As regards tests on penetration, compactness and absorption of water under pressure, elasticity, impact, etc., impossible to summarize same as time fails us.

**Corrugations.** — This defect should be attributed, principally, to the effect of traffic. The jolting of the vehicles occasions a new disposition in the component elements of the road, changing its structure. Under these circumstances the material is accumulated in certain points, where the corrugations are formed. Most frequently they exist transversally to the axis of the road.

The factors concerned are :—

1° Stability of the foundation and the sub soil;

2° The irregularity of the profile of the foundation occasions variable thicknesses in the mixture of the asphalt, of the pavement and consequent differences in the compression;

3° The very smooth foundation, which may cause a slipping of the asphaltic mixture on its surface;

4° Bad quality of the asphaltic mixture;

5° Defect of construction;

6° Exterior causes;

The considerations of a general character which I have just developped are summarized at the end of my Report. The French Delegation has, however, drafted some conclusions on the subject in a more precise form. These conclusions have been submitted to me and I very willingly make them my own. I am going to read them to you and ask you to take them as the basis of our discussion.

CONCLUSIONS. - 1. For modern roads satisfactory results are obtained by the use of certain methods of surfacing called bituminous or asphaltic.

2. Approximately it may be said that English experience and American (Canada and the United States) experience give two satisfactory forms of two coat sheet asphalt and of asphaltic concrete; and that French experience gives a satisfactory form of one coat surfacing.

3. Operative methods, the making and applying of the mixtures, seem to be henceforth technically well determined.

The qualitative determination of the elements of the mixtures is also known.

Not so the quantitative determination. This is however a function of the climate and the traffic on the road, and cannot receive a unique solution; besides account must be taken of economical requirements and of the expense attaching to the transport of the materials.

The standardisation of aggregates and binders, which has been obtained in certain regions, if it encourages rapidity, simplicity and economy of the work, is not always desirable, as it inevitably leads, in different regions, to the application of mixtures under unsatisfactory conditions, and consequently gives mediocre results as far as the good preservation of the road is concerned.

4. It is of particular importance :—

a) To continue observations and researches on the effects obtained in as far as the preservation of the road is concerned by

varying the proportions of the materials for the aggregates and their relative sizes — it being understood that the Mixtures should always be compact and present the fewest voids possible.

b) Efforts should be concentrated on seeking the causes of corrugations and the means of suppressing them.

5. It is recommended as a condition of success more especially for one coat sheet asphalt, that the accessory work be carefully executed; the adaptation of the existing road as foundation, the drainage, the templates for the surfacing, etc.

THE CHAIRMAN. — Gentlemen, we have heard with much pleasure the remarks of Mr. SAINZ, General Reporter. He submits to you a text of conclusions drawn up in agreement with the French delegates. It is this text which we are going to submit to your deliberations.

Mr. GENARD (Belgium). — I propose that we examine the conclusions, article by article. Mr. BRESSEY could tell us while doing so, in the name of the British delegation, what are the modifications which the latter proposes to present.

THE CHAIRMAN. — We will begin then with conclusion n° 1. (The text of this conclusion is read again).

Mr. BRESSEY (Great Britain). — We have no objections to present with respect to the first conclusion.

Mr. GENARD (Belgium). — Allow me to submit a slight observation : It seems to me that we lay too much stress on bituminous dressing. Now there is a report presented to the Congress by one of its eminent members, Mr. DE ROUCK engineer of Roads and Bridges, who unfortunately is abroad, and is thus prevented from taking part in our discussions. This report points out especially the experiments carried out in America with Asphalt-blocks and the Belgian Government had sent there one of its engineers to study this new process of surfacing. Experiments were made in Belgium with this Asphalt-block in surfacing roads, and, personally I have had this process on bridge roads. We do not possess much experience, but the results which we have obtained in Belgium permit us to say that, up to the present, the asphalt-block has given much satisfaction, consequently, it appears to me advisable to point out in a special manner, the utility of this kind of



dressings. I should like the first conclusion to be modified as follows.

Satisfactory results on modern roads are obtained by the use of certain surfacing methods called bituminous, in one or two coats, or with " *asphalt-block* ".

Mr. BRUSSEY. — Mr. GENARD has just remarked that a certain number of trials carried out in Belgium with squares of asphalt called " *Asphalt-blocks* " were highly successful, and he proposes to mention them explicitly. I consider for my part, that it would be better in our conclusions not to cite private processes.

Mr. TIR (France). — It seems to me that the text of conclusion I is sufficiently general to include the processes of paving with asphalt paving without it being necessary to quote such and such a system, and the more so as Mr. GENARD was not able after his personal trials to give a favourable opinion of asphalt-block except for very special cases. The experiments of Mr. GENARD have succeeded; others may not have been so satisfactory. Let us be content with saying that " certain kinds of surfacing called bituminous or asphaltic " give satisfactory results.

*Several English and American Delegates.* — We agree.

Mr. GENARD. — It is perfectly true that in certain cases the asphalt-block has not given good results. But that is true also of all bituminous or asphalt surfacing and we do not say on that account that bituminous surfacing does not give much satisfaction. My proposal is well justified, for, if the terms of the first conclusion have a very general bearing, those of the last conclusion only contemplate dressings of one or two layers and neglect the methods based on the employ of asphalt-block surfacings.

I should, moreover, declare myself satisfied if the proposal which I have just made figured on the report of proceedings of to day's meeting.

I point out in conclusion that the asphalt-block was not only used at Antwerp, but still in other parts of Belgium and has given very good results.

Mr. LAGASSE DE LOCHT (Belgium). — Then why not read it in our conclusions.

Mr. CAUFRIEZ (Belgium). — Gentlemen, I note what Mr. GENARD has said with respect to the results obtained in Belgium by the use of asphalt-block.

However, I object to his suggestion in principle. When concrete carriageways were dealt with yesterday, a specific reference to concrete slabs was not permitted, as we did not wish to carry the specification into too great detail but rather remain in the domain of generalities.

I consider then that to give our work the character of indispensable homogeneity, we must not, after having admitted a general form of wording, which moreover I do not consider excellent, but before which I submit, we must not, I repeat, depart from that attitude and consequently I am obliged to separate myself from my colleague Mr. GENARD.

Mr. ZARDOYA (Spain). — I should like for my part to plead in favour of compressed asphalt squares.

This kind of paving has always been very successful in Spain, not only for passages, for pedestrians but also for vehicles. Among the various places where it has been adopted can be cited, an important factory, the manufacture of tobaccos of Alicant of which the paving has borne for ten years an intense traffic of vehicles, without having been damaged, and without being slippery under the horses' feet.

From the point of view of repairs, it presents, to my idea, the greatest advantages owing to the facility in which it can be redressed.

Also I shall support the proposal of Mr. GENARD.

Mr. GENARD. — My dear colleagues, I must answer my esteemed colleague Mr. CAUFRIEZ. It is perfectly clear that at yesterday's meeting, the assembly on the proposal of Mr. MAHIEU refused to admit the detailed specifications. But the case is not the same to-day. The proposal made yesterday had in view a project which had not been experimented with, but here we have for us the results of an experiment which it is advisable to record. I maintain then my proposition.

Mr. MAHIEU (France). — If the proposal of Mr. GENARD was adopted by the Congress, we should arrive at this result, that it would suffice that an experiment pointed out in the report had been carried out in order that it be introduced in the conclusions of Congress.

What I wish to say is that the text of the Conclusion n° 1 which is accepted by the French, British and Spanish delegations is quite of a general character. It does not exclude the asphalt-block, and consequently it is in my opinion, quite useless to add anything to it. If we added something, we would risk having protests from other countries, or the inventors of other private processes.

Mr. GENARD. -- Then I ask that my observation be recorded.

Mr. MAHIEU. -- That goes without saying: the minutes of the meeting will record it.

Mr. BRISSEY. -- Mr. MAHIEU maintains that various processes including the asphalt-blocks are comprised without exception in the conclusion n° 1 as it is drawn up, and I am of his opinion.

Mr. LO GATTO (Italy). -- It is also mine, but it seems to me that a mention concerning asphalt pavements could figure in the second conclusion. They speak of experiments having led to satisfactory conclusions: they might add something about dressings of only one layer, and processes such as asphalt-block. (*Signs of approval.*)

THE CHAIRMAN. -- We shall see that in the second conclusion.

Gentlemen, I am going to put to the vote the first conclusion which is accepted by the General Reporter, the French and British delegations.

On the other hand Mr. GENARD (Belgium) and Mr. ZARDOYA (Spain) are desirous that the asphalt-block be mentioned.

It is this amendment that I am going to put to the vote first of all (The amendment is not carried).

I now put to the vote the text of the conclusion thus drawn up:—

" 1. — For modern roads, satisfactory results are obtained by the use of certain methods of surfacing called Bituminous or Asphaltic ". (Carried.)

THE CHAIRMAN. -- We shall pass to the second conclusion which is proposed to us.

The text is thus worded:—

" 2. — Approximately it may be said that English experience and American (Canada and the United States) experience give

two satisfactory forms of two coat sheet asphalt and of asphaltic concrete; and that French experience gives a satisfactory form of one coat surfacing ”.

Mr. GENARD and Mr. ZARDOYA propose to add : “ Interesting trials were made with asphalt-blocks ”.

Mr. BRESSEY. — Gentlemen, our American colleague Mr. W. W. CROSBY suggests that it would be better not to mention the different countries where the trials are made. The British delegation is also of this opinion.

We propose then that the designation of the countries where the trials were carried on be suppressed; it would simply be said that the reports presented show that various processes have been experimented with, and have given satisfaction i. e. the three general types as follows : asphalt of one layer, asphalt of two layers and method of penetration (grouting).

Mr. TUR. — I have no objection to make to the modification asked for by the English delegation.

Mr. GENARD. — By adding to it a mention for asphalt-block.

Mr. CARLIER (Belgium). — It seems to me difficult to consider asphalt-block pavements as mere trials, for the pavements made, up to now, are very important. I find in particular on page 6 of the General Report that in the United States with this process alone, employed since 1900, they have constructed 13,900,000 square metres (1), and that by a single company, and it is certain that in the United States there are other companies manufacturing this kind of paving.

In Belgium there are three of them.

Mr. ZARDOYA. — I urge again since the first conclusion has been settled to insert the words “ asphalt squares or paving ” in the second conclusion where the asphaltic concrete is already defined with one or two layers as well as the method of penetration : really it is not trials which we have carried out in Spain, but indeed extended and definite applications which we have realized and which give the best results.

It is to be noted that at least many Spanish engineers agree to this amendment.

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(1) 10,621,400 sq. yds.

Mr. BRESSEY. — While we are still discussing as to whether there is occasion to introduce the words : " asphalt squares " or " asphalt-block " in the second conclusion, I would remind you that the English delegates are averse to mentioning any particular process.

Mr. MAHIEU. — We can very well mention in the second conclusion the generic term " asphalt paving " in the same way as an asphaltic dressing of an other kind. But the particular term " asphalt-block " can not be employed.

Mr. CAUFRIEZ. -- That is just as much a pavement as any other.

Mr. BIELS (Belgium). — It is precisely on this denomination that I would like to say a few words. I believe that the opposition of certain members of this assembly is only against the use in the French text of the English word " asphalt-block " which was adopted as its trade mark by a commercial firm. To avoid any complaints without prejudicing the value of these products, it would be sufficient to replace the word " asphalt-block " by those of " asphaltic or bituminous slabs ". (*Applause.*)

Mr. MAHIEU. — I agree entirely with the proposal of Mr. BIELS. I know that " asphalt block " belongs to a firm, that is why I wished to replace this word. The conclusion then would be thus worded :—

" 2. — The Reports that have been presented show that success has attended the application of surfacing methods with asphalt and bitumen, both, in single and double coat work.

" Satisfactory trials have also been attained in the application of grouting and the laying of asphaltic or bituminous blocks ".

Mr. VANDONE (Italy). — I propose that instead of saying other " trials " we say other " applications " were also made by the penetration method and with asphaltic and bituminous slabs.

Mr. MAHIEU. — I agree.

Mr. CAUFRIEZ. — I call your attention to a shade of difference which seems to have its importance. In fact, in the first part of the conclusion which has been read by Mr. MAHIEU, it is said the methods of dressing have been applied with success. Immediately after it is said that applications by the penetration

method and under the form of slab paving are interesting. In my opinion it should be said that these applications were also highly successful.

THE CHAIRMAN. — It seems to me that we have come to the end of the discussion and everybody appears to me to agree to adopt the second conclusion as amended by Messrs BRESSEY, BIJLS, VANDONE and CAUFRIEZ.

It would be thus drawn up :—

" 2. — The Reports that have been presented show that success has attended the application of surfacing methods with asphalt and bitumen, both, in single and double coat work.

" Satisfactory results have also been attained in the application of grouting and the laying of asphaltic or bituminous blocks ".

Mr. ZARDOYA had asked to speak; but I ask him that in case this wording would satisfy him, to abandon it in order to allow us to have this conclusion consented to.

Mr. ZARDOYA. — Accepted.

THE CHAIRMAN. — I put the second conclusion to the vote such as I have just read.

(Carried.)

Let us pass to the third conclusion which Mr. TUR will kindly read to us :—

" 3. — Operative methods, the making and applying of the mixtures seem to be henceforth technically well determined; the qualitative determination of the elements of the mixtures is also known.

" Not so the quantitative determination. This is however a function of the climate and the traffic on the road, and cannot receive a unique solution, besides account must be taken of economical requirements and of the expense attaching to the transport of the materials.

" The standardisation of aggregates and binders, which has been obtained in certain regions, if it encourages rapidity, simplicity and economy of work, is not always desirable, as it inevitably leads, in different regions, to the application of mixtures under unsatisfactory conditions, and consequently gives mediocre results as far as the good preservation of the road is concerned ".

Mr. BRESSEY. — With respect to the third conclusion, the British delegation propose certain modifications.

The first and second new paragraphs could be united in one as referring to mixing processes.

With respect to the third new paragraph which deals with the quantitative determination, I would urge that it is indispensable to take local resources into consideration, with regard to available material. There should thus be added to the French text the words " and local resources of material ".

Mr. MAHIEU. — We agree to accept these modifications.

THE CHAIRMAN. — The proposed modifications do not affect the principles at all. I propose to accept; unless a member of Congress desires to speak against this motion.

Mr. VANDONE (Italy). — I desire to make a remark about the last paragraph of the conclusion we are discussing. It is said there that the " standardisation of aggregates and binders leads inevitably in different regions to the applications of mixtures under unsatisfactory conditions ". This wording seems to exclude compressed asphalt, which is not a mixture.

Mr. MAHIEU. — We agree but you will remark that the whole of the third conclusion relates to mixtures.

Mr. DE SILVA FREIRE (Brazil). — I beg to propose with respect to the third conclusion, the following addition :—

" Furthermore, in the present state of the tests applicable to bitumens and asphalts the specifications of these materials afford insufficient data for the choice of a binder without previous local experience ".

I wish to say by that because a binder has been satisfactory, it does not follow that a binder answering the same specifications would be successful under different conditions of situation and employment.

Mr. TUR. — We do not object to the addition proposed by Mr. DE SILVA FREIRE. I do not think that this proposal will meet with the disapproval of the British delegation.

THE CHAIRMAN. — I put to the vote the text of the third conclusion amended as Messrs BRESSEY and DA SILVA FREIRE

have proposed, amendments which seem to me to meet with general approbation. (*Approval.*)

The third conclusion thus amended is carried.

THE CHAIRMAN. — Messrs, the members of Congress, before continuing. I take the liberty of reading a telegram which has just been communicated to me. It is from His Majesty King ALPHONSE XIIIth, and is addressed to His Royal Highness Don CARLOS in answer to a telegram which the latter sent him to give an account of the opening of our Congress. Here is the text (*All the members of Congress stand up*) :—

“ My hearty thanks for the telegram which you have sent me in the name of the International Road Congress; I beg you, when transmitting my sincere gratitude to the members of Congress to salute them in my name, and to tell them how sincerely I wish that their task may meet with every success. I am especially happy to wish them a hearty welcome to Spain and to this beautiful city, where I do not doubt they will find the hearty welcome such as deserve all those who have co-operated in a work of such importance for the progress and prosperity of the people, I shall be grateful if you will inform the Delegates that I also express my wishes for the prosperity of the countries they represent and for their personal welfare. — ALFONSO ”.

(*Applause.*)

THE CHAIRMAN. — We shall now pass to the fourth conclusion which I beg Mr. TUR to read.

MR. TUR. — “ 4. — It is of particular importance :—

“ a) To continue observations and researches on the effects obtained in as far as the preservation of the road is concerned by varying the proportions of the materials for the aggregates and their relative sizes — it being understood that the mixtures should always be compact and present the fewest voids possible.

“ b) Efforts should be concentrated, on seeking the causes of corrugations and the means of suppressing them ”.

MR. BRESSEY. — I accept this wording. Perhaps also the third and fourth conclusions might be joined into one, both referring to the same mixing processes.

MR. MAHIEU. — It is certain that the third and fourth conclusions apply to the mixing processes. But as it is a question of



different line of thought I believe that it would be better to leave them apart.

Mr. H. V. RYGNÆR (Denmark). — In my report on the second question, I have mentioned the use of asphaltic oil as a substitute for tar. This enables the road to support a more intense traffic than roads which are merely tarred. It is a mixture of bitumen and mineral oils. I have pointed out the difficulties met with in obtaining a really suitable mixture, trials were made with mixtures having a proportion of bitumen running from 45 to 75 %

I think I have set forth that is necessary to use a heavy oil, that is to say, containing sufficient asphalt.

THE CHAIRMAN. — The indications given by Mr. RYGNÆR are very interesting, but as it is a question of a particular treatment, I do not think it should be inserted in our conclusions which are of a general order. We shall point it out to the Permanent Commission of our Congresses. (*Approval.*)

Mr. CAUTRIEZ. — Upon the first of the fourth conclusion, I ask that the observations be continued not only on the aggregates, but also on the methods of mixture.

Mr. TUR. — I do not see any objection.

Mr. BRESSEY. — Nor do I.

THE CHAIRMAN. — Everybody agreeing, I put to the vote the text of the conclusion n° 4 with the addition proposed by Mr. CAUTRIEZ. (*Carried.*)

We shall now pass to the fifth conclusion.

Mr. TUR reads the fifth and last conclusion thus drawn up.

" 5. — It is recommended as a condition of success more especially for one coat sheet asphalt, that the accessory work be carefully executed; the adaptation of the existing road as foundation, the drainage, the templates for the surfacing, etc.

Mr. BRESSEY. — Gentlemen, it is suggested by the British delegation to exclude from the fifth resolution the following remark : " especially for one coat sheet asphalt " because this statement of the necessity of careful execution of the accessory work refers to all forms of asphaltic pavements.

Do you agree to this.

(*Affirmative answers.*)

Mr. MAHIEU. — We agree to this suppression.

Mr. CAUFRIEZ. — I support the French wording, amended by the English delegation.

A DELEGATE. — We could add that the application of a dressing " must be done in favourable weather ". I do not say by fine weather, because I think that the responsibility of choosing the proper time should be left to the director of works. (*Assent.*)

Mr. BILLS. — I support the proposal made to suppress the words " sheet asphalt ". However, it will be necessary to specify that the text of the fifth conclusion thus modified is applied to dressings with two layers.

Mr. MAHIEU. — Yes, it is a question of adjustment in the wording.

Mr. VANDONE. — They have not specified in the conclusions, the tests on delivery of material which is employed in asphaltic dressings, I find they have not made progress on this question, and they ought to be encouraged.

Mr. TER. — The addition to the conclusion n° 3 on the proposal of Mr. DA SILVA FREIRE does not appear to satisfy your desires.

Mr. VANDONE. — The addition of Mr. DA SILVA FREIRE is purely negative. I should like a positive motion to be added recommending continuous study of this question in view of the standardisation of methods of testing bituminous material on delivery.

THE CHAIRMAN. — I think there no opposition to this proposal being adopted. (*Assent.*)

I put to the vote the conclusion n° 5 modified in the following manner to take account of the amendments which were proposed :—

" 5. — It is recommended as a condition of success that surfacing work should be carried out in favourable weather and that particular care should be bestowed on so called accessory works, i. e. the preparation of the existing road bed as foundation, its drainage, its lateral abutment and adequate bond between the subcrust and the surface as well as between the two coats, in case of need.

" It is also recommended that investigations should be pursued into the standardisation of analyses and tests applied to bituminous materials ".

This text is adopted.

THE CHAIRMAN. — Gentlemen, we are at the end of the task which was assigned to us to-day. It only remains for me to thank you. (*Applause.*)

The meeting closed at 11,45 am.

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FIRST SECTION  
CONSTRUCTION AND MAINTENANCE

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THIRD MEETING  
Friday May 11, 1923

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3rd QUESTION

**Laying Tramway-rails on the various kinds  
of road surface**

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*Chairman : Mr. SPITERI.*

The meeting opened at 9,30 am.

THE CHAIRMAN. — Mr. DICENTA, General Reporter of the third Question will speak.

Mr. DICENTA, *General Reporter*. — Gentlemen, the unmerited honour which the Permanent Commission of the IVth International Road Congresses has conferred upon me by appointing me General Reporter on this third question, gives me the satisfaction of greeting my colleagues assembled here and to express publicly the gratitude we owe to all the eminent Engineers who have contributed to the success of this Congress by presenting papers on the various questions which were submitted to them.

The subject is the following :—

“ Laying of tramway rails on various kinds of road surface,  
Advantages and disadvantages of the various types of road —  
Connection between the rail and the surface — Means for  
attenuating noise and vibration

Nine papers were presented on this question. The paper presented by the engineers of the United States comprise ten notes all very interesting referring in a more or less direct manner to the subjects proposed by the Congress.

As a rule the engineer in charge of the construction of a tram-line does not generally enjoy the same liberty as he who draws up the plan of works and is not under the orders of another. The tram-line is in direct relation with the road where it must be laid and consequently the engineer who plans it is in some way the slave of the characteristics of the lay-out and its mode of construction, he is also bound to consider not only the traffic of the line which he constructs but also the whole of the traffic on the highway on which the line must be constructed.

Therefore the papers presented deal with a great number of systems applicable according to the characteristics of the track where the tramway line must be established.

But a point on which the papers agree is that the laying of a tramway line in a road, whatever be the nature of the pavement and its traffic is injurious to the maintenance of the road. Nevertheless the ever increasing utility of the tramway owing to the growth of our large towns, the necessity of facilitating the communication between their outlying districts leads necessarily to the development of this kind of transport regardless of the inevitable and inherent difficulties of the system; the latter must then be improved so that the ordinary road is as little damaged as possible, and that in its turn the tram-line has only to suffer very slightly from the general traffic.

All the papers deal chiefly with the strength of the sub-soil on which the line must be laid, they give this question all the importance it deserves, as also the cleaning of the line and the drainage of the water which directly or indirectly crosses the paving of the roadway to penetrate the sub-soil. They offer various solutions and agree to give this subject great importance.

The systems of foundation are divided into two classes: elastic systems and rigid systems. It is clear that when the tramways were worked by animal traction and their traffic like that of the streets was relatively small the rails were laid on the natural earth on broken stone or on trenches filled with ballast; but in proportion as the traffic increased and the weight of the vehicles became greater, it became apparent that more importance must be given to the foundation of the roadway; to

this end various systems were resorted to : laying the rails on wooden sleepers lying on a bed of ballast, on metal or concrete ties, of different types and varieties, although the two last did not give very good results. The transformation of animal traction into electric traction, which has brought about an increase of the weight of the vehicles and their speed has had this result of conferring, an ever increasing importance to the substructure of the line : thus many systems were adopted and it has become more and more the custom to lay tram rails on a rigid foundation : from this originated the concrete foundation under its various forms. There are many processes : in the United States, Holland, and Switzerland the rail is placed on wooden sleepers; elsewhere chairs are used resting on concrete; in other countries among which France may be cited, the rails are laid on chairs by means of special iron stays, to which the rail is fixed. The English lay the rail directly on the concrete but interpose between the chair and the concrete a bituminous substance, asphalt or bitumen which gives a certain elasticity to the track.

The systems employed are varied; each country, in the paper which it presents describes that which is most generally used making allowance for the nature of its pavements : it is then unnecessary for me to dwell further on the study of the different processes of which I do not pretend to give at the most more than a general idea.

At the same time as more importance was given the foundation the rails were rendered more resistant. The rail which at the beginning was light has been increasing in weight, this increase of weight was destined, not only to enable it to resist the heavier weight of the vehicles to which it gives passage but also to permit it to resist that of the vehicles, which do not use the line, motor-buses, etc., the rails have then undergone a transformation and rails of 52.57 and even 60 kilogrammes (1) per lineal meter have been used. In order to render the laying of the paving easier, the height of the rail was increased in its turn up to 180 mm. (2).

In one of the Papers submitted, a profound study was made of the most suitable ratio to be adopted between the total height of the rail and the width of the chair. It is clear that whenever

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(1) 115 to 132 lbs.

(2) 7.08 inches.

it is a question of an urban tramway special rails are used; it is only in the case where the tram-line is distinctly separated from the rest of the traffic that the ordinary type can be used.

One of the weakest points in any working of a tramway is that of the joints; therefore to diminish the number of joints 18 metre (1) rails are used. Particular care is taken in the construction of the joints: they can now be done away with, by continuing the rail by means of autogenous welding or by other processes which can be used for this purpose.

I have indicated at the beginning, when the tramway forms an inherent part of an other public road, the paving employed between the rails and in the margins must be the same for the rest of the road.

For macadamised roads, the paving may be improved by the use of tar-macadam adjoining the stone setts which should be laid up to the rails and between the rails.

Care should be taken to ensure the watertightness of the joints in the paving in order to avoid the infiltration of water. All the authors recommend for this purpose to fill in the joints of ordinary stone paving, with cement mortar in the rows alongside the rails. One of the points by which the water can penetrate is at the joint of the rail with the paving and there is occasion to seek special devices for binding; at Madrid pressed brick is used; cement can also be used.

It is also recommended in order to avoid noise, to utilize for the filling of the joints a mixture of pitch or tar, instead of cement mortar. With special or asphaltic pavements, it is impossible to bring the asphalt into complete contact with the rail; it is only when there are continuous joints, that it is possible to do so.

All the authors, whether European or American, advise the protection of the rail by means of a row of setts or preferably wood-blocks, in order to have the greatest elasticity possible and not to occasion any noise. In other regions granite setts are used, but all the Papers agree that there is occasion to break off the asphaltic pavements before they arrive in contact with the line.

At Madrid, Barcelona and in certain places, they do not limit themselves to protecting the rail; they break off the asphaltic pavement at the proximity of the rail and they replace the

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(1) 19 yards, 2 feet.

asphalt, in the road and between the lines, and, in the margins, over a width of 60 cms. (1) by a stone paving.

Noise and vibration occasion in any tramway undertaking great inconvenience to the public and travellers, especially in narrow streets. Efforts have been made to avoid this inconvenience; the solution of continuous joints has been rather successful; all the authors recommend hardening the rails by one or other of the present methods. It is especially necessary to suppress corrugations; care should also be taken in the selection of fish-plates.

I have been able to deduce some conclusions from the examination of all these papers, in which I took care. — I hope to have succeeded — to recapitulate all those which were presented in the papers. They are printed at the end of my general report and could serve as a base for discussion. I do not think it necessary to re-read them entirely.

THE CHAIRMAN. — Mr. DICENTA, General Reporter, has laid before us a statement of the question which we are studying in this section after having very carefully studied in detail the papers presented, he has undertaken a work of synthesis, choosing among all the conclusions those which could be presented as general, and which consequently could be accepted by everybody.

He has thus drawn from the various reports the twelve conclusions which we shall be able to examine successively.

Mr. MARIAGE (France). — Gentlemen, I should like in the name of the French delegation, to speak to you on this important question of tram-lines.

We have studied all the reports presented.

These reports constitute a very remarkable documentation on all the systems which have been used in the various countries.

Two cases should be at first very clearly distinguished. The first is that of tram-lines, laid on roads outside the towns. In this case all the reporters agree in considering that the best solution would be to place the line away from the road.

The second case refers to the construction of lines in towns.

In this case the necessities of transport must be taken into account. We all agree to this. It was made the object of

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(1) 2 feet.



desiderata set forth in the first conclusion formulated in the General Report.

With respect to the other conclusions which figure in the General Report, we thought it preferable to condense them in three, one relating to the foundation, the other relating to the rails, and the third relating to the surfacing of the roads.

With respect to the foundation of the lines in roads, there will be perhaps more difference of opinion, and I believe that at the time of discussion there will be occasion to take up again the arguments of the reporters on this question.

The two other conclusions relating to rails and pavements of roads will perhaps give rise to discussion.

I beg in summing up to lay on the desk the text herewith.

*Conclusions of a general nature.*

It appears from the papers that one cannot indicate a priori the method of execution which is the most suitable for tram tracks. The solution of the problem is of principal importance from an economic point of view and, in each case, the system must be sought, which, while from a technical point of view, providing guarantees of the greatest stability will give a minimum cost of construction and of working expenses.

*First Conclusion.* — The laying of tramways-rails on a roadway is harmful to the maintenance of every kind of surfacing but the services rendered by tramways are of such vital public interest that every investigation should be made into methods calculated to reconcile the requirements of construction and maintenance of the carriage-way with those of the tramway-track.

Therefore the method of execution which is applicable in each case, should be seriously studied taking into account the nature of the soil, the plans and sections of the roads, the nature of surfacing and the requirements of the general traffic, so as to choose the most appropriate method. The best solution will be, when this is possible, to lay the tramway on tracks separated from the parts reserved for general traffic.

*Second Conclusion.* — It is necessary to investigate the means of ensuring the maximum of stability for the track as much from the point of view of the preservation of the surfacing as of the reduction in the cost of maintenance; consequently whenever the nature of the surfacing or the

conditions of general traffic requires it, the track will be laid on a concrete foundation and secured to it by elastic and watertight systems.

When the tramway traffic and the weight of the cars are light, the rails may be laid directly on the natural soil if this is formed of gravel or sand; in other cases on a bed of broken stone or ballast.

If the traffic is more intense and if the weight of the cars is medium, the rails may be laid on wooden sleepers placed on a bed of ballast.

These two last systems of laying are not applicable when the surfacing is of wood, asphalt or concrete.

For all foundations of tracks, every precaution must be taken to secure adequate drainage.

*Third Conclusion.* — The most suitable type of rail to employ on roads, whatever the surfacing may be, is the grooved rail. The joints should be whenever possible welded; if not, the fish plates should be long and of a section which will accurately fit the rail.

Corrugation should be prevented and immediately removed if occurring.

The crossing appliances in tracks should be constructed and maintained so as to avoid shocks at the crossings and joints so as to ensure the life of the track and to avoid or reduce noise and vibration. For the same purpose, the motors and gears of the cars should be improved.

*Fourth Conclusion.* — In case of set surfacings, a watertight joint should be made in such a manner as to ensure the perfect maintenance of the whole and avoid the filtration of surface water. In the case of asphalt roads, one or two rows of sets should be laid between the rail and the asphalt, adjoining the rail as mentioned above.

Mr. BRESSEY (Great Britain). — Gentlemen, in general, the British members of the Congress accept the views expressed in the text of the French delegation, which moreover agree with those of the General Report : but there exist so many petty technical differences of opinion between the various countries, that it would seem advisable to refer the points of detail of the text, as was done for the two first questions, to a sub-committee composed of delegates of Spain, France, Belgium and

England. A definite text would be drawn up, especially with respect to the details of construction, foundation, and paving.

Mr. DICENTA, *General Reporter*. — I have examined attentively the text of the conclusions of the French delegation. I have compared them with those of the Spanish delegation, and I find no essential difference at all between them. There is hardly any except certain points of detail which could be referred to the sub-committee, which according to the suggestions of Mr. BRESSEY is going to be formed.

In my report I have collected, as presenting a general character, and as figuring in the papers presented by the different countries, the conclusions which were in a general manner taken into account by the French and British delegations. After all, I support entirely the proposal of the French and British delegations, and it is very willingly that I will aid to condense the conclusions, by retaining all that is to my mind essential, and yet accepting all that would appear essential to the other members of the sub-committee. (*Applause.*)

Mr. W. W. CROSBY (United States). — I support also what has just been said. To my mind the French text could form the base of deliberations of the sub-committee of which Mr. BRESSEY has spoken since the General Reporter and the Spanish Delegation are willing to agree to this procedure. The observations and propositions concerning the different points to be dealt with can now be presented and I think it is very important that they be corrected by the limited Committee of which mention has been made.

THE CHAIRMAN. — Mr. MARIAGE, French delegate, Mr. BRESSEY, English delegate, and Mr. CROSBY, United States, declare to the assembly that they are in agreement on the main points of the question but owing to the diversity of points of detail in constructing tram-lines, and to the ways of interpreting these general ideas under a form as concrete as possible these gentlemen consider that a commission should be appointed composed of Spanish, French, Belgian, English and American delegates and representatives which will be charged to draw up concrete and definite conclusions under the form they consider the most suitable and the most likely to bring about an agreement and by taking into consideration all the opinions which will have been expressed here.

This is advocated by the speakers who have spoken before me. I submit their proposition to the deliberations of the assembly so that if it is approved we can carry on in the way thus indicated.

Mr. MAHIEU (France). — I believe in effect that the proposition of the British delegation is useful. But it is well understood that we shall come to an agreement here this morning on the principles. The definite wording would then be submitted to the General Assembly. This wording would be prepared by a sub-committee, which could consist of the General Reporter (Spain), Messrs MARIAGE (France), BRODIE (Great Britain), CROSBY (United States), D'ILLOP (Belgium) and VANDONE (Italy). It is to be clearly understood that the other delegations would be allowed to express their opinions if they so desired. Thus the work would be facilitated. I think an agreement will always be easier to realize between five people than if we were fifty. (*Applause.*)

Mr. GUIET (France). — I intend to make some observations to the sub-committee which is going to assemble concerning the first conclusion presented by the French delegation.

If I may be heard there I shall say nothing at this meeting.

Mr. MAHIEU. — Agreed. You will present your observations before the sub-committee.

THE CHAIRMAN. — There seems to be agreement to the nomination of the sub-committee and the names of its members. (*Approval.*)

The sub-committee will assemble immediately after the meeting.

We are now going to examine the conclusions in principle, taking as guide the text proposed by Mr. MARIAGE.

The Speakers, who would like to present observations on each of these points will kindly make them known and we will discuss them.

THE CHAIRMAN. — On the text of the conclusion of general order, have you any objections to make? No observations, it is adopted.

Let us pass to the 1st Conclusion.

Mr. GUIET. — I see in the text of this first conclusion this sentence: The laying of tramway rails in a road is undoubtedly

harmful to the maintenance of the surfacing whatever kind it may be; it is this word " undoubtedly " which I find excessive, I should prefer the word " generally " and I shall with your permission explain myself. There are certain surfacings which have given proof of their quality. With a kind of surfacing which I advocate (and which is described in my Notice) and which was made fifteen years ago there have been no cracks. The road has not changed and the tram-line required no repairs.

The surfacing of which I am speaking was the subject of chapter 7 of the report N° 4 of Messrs VARVIER and NICOLAS on the 1st question. It seems to me that they have forgotten to report it. I arrived at the meeting when the question was dealt with, but will Messrs VARVIER and NICOLAS permit me to draw their attention on this point. The tram-line on this road has given excellent results, and I conclude by repeating that the word " undoubtedly " appears to me excessive and that it should be replaced by the word " generally ".

THE CHAIRMAN. — The sub-committee will deliberate upon it. Does anyone desire to make any observations on the first conclusion ?

Mr. W. W. CROSBY. — I have made some observations for the purpose of submitting them to the sub-commission. They are in fact summed up as follows. During the construction of tramway line care should be taken that the surfacing between the two tracks be the same nature as on the rest of the roads.

The written communication of Mr. Crosby is reproduced below.

NOTE. — *Communication by Mr. W. W. Crosby, regarding the laying of tramways rails in the various surfacing :*

The " *sine qua non* " the first essential, again fundamental in this connection is the attainment and preservation of the greatest possible uniformity or homogeneity of the roadway within and without i. e, including the tram area and the second essential is " *like unto it* " where any non-uniformity may be unavoidable, for a sufficient reason and must be accepted, the change from the ordinary uniformity to the extraordinary, and accidental must be gradual and not abrupt " On these two hang all the law and the prophets " in the matter.

To illustrate. Many are probably familiar with instances of flag-stone crossings over macadam roadways and with the difficulties attendant upon keeping the surface of the macadam in satisfactory condition for the space of a yard or so immediately adjacent to the edges

of the cross-walk. That is a simple example of the same situation as where a rigidly built tramway track crosses or runs parallel in the same roadway, to the traffic lines. And a sewer or other manhole with a metal top and cover rigidly built in a macadam roadway offers a common example of non-uniformity.

Again, many have doubtless observed the ill effects on an otherwise excellent street surface, from the presence within it of tramway tracks too fragiley constructed to support correspondingly with the street surfacing itself, the traffic over them.

A street surface of sheet asphalt on a cement concrete base for instance necessitates a tramway construction of the highest type (probably with a cement concrete foundation for the ties) as does a stone-block or wood pavement on a similar base.

In a macadam roadway or in a roadway of bituminous construction without a cement concrete foundation this rigid type of tramway construction would be equally out of place and unsatisfactory.

In the design one should strive for comparable and similar rigidity under the traffic each is to bear for both the tramways area and the roadway adjacent when all the factors of loads, drainage, costs, facilities for repairs and renewals, etc. are properly considered.

I shall then conclude in this way :

Substitute for 9th conclusion of General reporter :

“ Except in cases where the tramway is separated from the roadway the pavement of the tracks should have as nearly as possible the same resistance and rigidity as the adjacent roadways provided for general traffic ”

Mr. BRESSEY. — The British delegation also agree that it is important in the construction of tramways, that the surfacing placed between the rails should be the same as that which covers the other parts of the street.

THE CHAIRMAN. — Thus as the Congressists may have heard the communication of Mr. CROSNY refers to the kind of surfacing; it will be examined in a special manner by the sub-committee.

We can now pass to the examination of the second conclusion read just now by Mr. MARIAGE and which concerns the foundations (The text of this conclusion is read again).

Has anyone an observation to make ?

Mr. ZARDOYA (Spain). — I believe that we are starting from an erroneous principle : we are in fact discussing the text of the French proposition which has not yet been adopted by the assembly. Therefore to my mind the observations to be made

ought in my opinion to refer to the conclusions of the papers of Mr. DICENTA not to the French conclusions.

THE CHAIRMAN. — But I remind you that in agreement with Mr. DICENTA we have decided that considering the practical unanimity which exists on the main point and on the principle between the conclusions in the General Report and those drawn up by the French delegation, we should nominate a sub-committee (as has been done) to deal with the details of the text to condense these ideas and to devise more concrete and more precise terms. At the present time we are in agreement on the principles and we shall consider the modifications which the sub-committee will be able to review and more generally those which the assembly itself can envisage concerning the principles which serve as a basis to these conclusions.

I think that Mr. ZARDOYA can declare himself satisfied with the explanations (Mr. ZARDOYA makes a affirmative sign).

Mr. DICENTA, *General Reporter*. — To avoid all ambiguity we could proceed in the following manner :—

I have studied the conclusions of the French delegation : I shall thus be able as I read those of my report to tell you what they have in common with the French conclusions.

In this way the Congressists will be able to appreciate on what points and in what measure the accord is, or is not realized.

For instance here in the second conclusion such as it appeared in my General Report :—

" Secondly. — The nature of the ground upon which the track has to be constructed must be taken into account in the selection of the most suitable system of foundation for the rails, through which the pressure due to the weight of the vehicles travelling over the rails is transmitted to the ground.

" It is also necessary previously to study the plan and cross-section of streets in which a tramway is to be laid, for the purpose of making necessary and possible alterations with a view to improving the conditions for the maintenance of the tramway and of the road ".

Therefore, the method of execution which is applicable in each case, should be seriously studied taking into account the nature of the soil, the plans and sections of the roads, the nature of surfacings and the requirements of the general traffic, so as to choose the most appropriate method. The best solution will be,

when this is possible, to lay the tramway on tracks separated from the parts reserved for general traffic.

As you see there is agreement of principles between the two texts.

THE CHAIRMAN. — It has already been said just now that there was agreement in the main between the conclusions of Mr. DICENTA and those of the French Delegation. There do not exist any differences of detail or form. The conclusions of Mr. DICENTA to which the French delegation adhere in principle are more developed : so it is proposed that as is the custom in all Congresses these conclusions be worded in as concrete and precise a manner as possible now. The second conclusion of Mr. DICENTA (as the letter has just shown us) is in accord with a passage of the first French conclusion. There is no divergence on the main point and there only subsists a simple question of form.

Mr. D'HOOR (Belgium). — I believe that the role of the sub-committee appointed at the beginning of the meeting is to word exactly the conclusions. Only we cannot know whether we have any objections in principle to make for we have not had sufficient time to take note of the conclusions of the French delegation.

To my mind the conclusions of the Report of the General Reporter should be discussed here and the sub-committee would then be charged to proceed with a definite wording.

Mr. MAHIEU. — That comes to the same thing since the details concerning the Spanish conclusions are comprised in the French conclusions. (*Approval.*)

If you have any objection of principle to make either to the conclusions of the French delegation, or to those of the Spanish delegation, present them now.

Mr. MARIAGE. — I propose to examine the question of the foundation, in the case of a modern road with a wooden or asphalt surfacing and having an intense tramway traffic.

I consider in this case a concrete foundation is necessary with the construction of an absolutely rigid track.

This point of view is not admitted by all the reporters; however I find in the various reports arguments very favourable to the thesis which I support.

In the Belgian Report, it is said (see page 12) that the



difficulty of the problem has limited the use of modern surfacing the development of which would be extremely desirable.

In the American Report (see page 9) Mr. NORTON expresses himself thus :—

" A rigid pavement or surfacing, suitable for heavy vehicular traffic, cannot be satisfactorily maintained adjacent to tramway tracks unless such tracks have equal rigidity. Less exacting surface requirements may warrant less rigid track construction ".

The Italian report in Chapter III places the question in its true light and it concludes thus (page 8) :—

" If all precautions are taken to ensure the durability of the track the rigid form will sometimes prove more economical than the elastic form, and compensate by reduced maintenance expenses the high cost of initial outlay ".

I agree entirely with this conclusion, and I am going to explain to you presently how the problem was solved at Paris.

The first conclusion inserted in the report (page 10) urged the necessity of an impeccable foundation.

The reporters of Holland fear that the rigid foundation will cause corrugation.

I am not of their opinion. In my experience there is as much undulatory wear, and even more perhaps, on roads with an elastic foundation, but to my idea the wear does not emanate from the foundation.

To explain how this problem has been studied in Paris, I shall remind you that the systems constructed with the use of the subterranean axial gutter has given remarkable results for the good maintenance of the line, for a great many years past.

On this subject it is interesting to see the solutions adopted in America (American report page 25) in London (English report, page 23) and finally in Paris since 1911.

Owing to these very remarkable results, it has been decided to adopt in Paris in streets with dense traffic and this is the most general case, metal chairs bedded in the concrete and serving to support the rails an elastic heel of oiled teak being placed between (see French report).

This solutions means heavy initial expenses, but it diminishes considerably the expenses of maintenance and renewals, and for the cases in view in Paris; it is certainly the most economical solution : the concrete of the foundation does not need to be

demolished during the renewal of the track, and the duration of the fixing chairs is practicably unlimited.

I shall be happy to show to the Congressists the tramway works thus carried out in Paris.

THE CHAIRMAN. — Mr. DICENTA would like to tell us his opinion on this most interesting question of the track and the foundation which was the subject of a remarkable " report " by Mr. MARIAGE

Mr. DICENTA, *General Reporter*. — I shall begin by congratulating Mr. MARIAGE who has veritably given a " report " of all the papers, bringing out the points of agreement; which is what I have done myself but not so brilliantly. The conclusions are the same on one side as the other and we do not differ in anything. My opinion was expressed (and it still is so) at the end of the conclusion (the 4th in my Report) which deals with the elastic foundation.

" Although these systems of elastic foundations have technical and economic advantages the use on streets of modern pavings, which is becoming more and more general, and the increased weight and speed of cars, are restricting their employment and are leading to rigid foundations being frequently substituted for elastic foundations ".

My conclusion n° 5 begins by these words " The laying of rails on a concrete foundation is the most suitable where there is intense traffic and the vehicles are very heavy : this foundation can be coated with all kinds of dressings ". I believe we are completely in agreement. It is clear, that with the improved methods of paving and with the generalised use of concrete as a basic element of modern surfacings, the tramways were also obliged to give up the elastic foundation.

With respect to the different ways of fixing the rail here is what can be said; in certain countries the rails are placed on wooden ties; notably in Belgium, it appears from an enquiry made by a distinguished engineer that 7 % of the lines are constructed after this method. In the United States wooden ties are utilised but on a concrete foundation.

It remains understood that the elastic foundation must not be condemned but owing to the characteristics of modern tramway, the increase of weight and speed, endeavours will be made to replace the elastic foundation by a rigid foundation.

For the rest, I consider that all the brilliant ideas given out

by Mr. MARIAGE are in the conclusions of the Spanish general report and figure under a condensed form in the conclusions of the French delegation. (*Applause.*)

Mr. BRISSEY. — Mr. DICENTA has commented on the 4°, 5°, 6° conclusions of the spanish text. The British delegation has some qualifications to formulate on these points : we will make them known to the sub-committee who are drawing up the conclusions.

THE CHAIRMAN. — The question of the foundation was examined by Mr. MARIAGE and by our reporter Mr. DICENTA. The British representative is in agreement on the main point, the question of principle submitted to our discussion is then perfectly definite and there a general agreement on the main point. (*Applause.*)

Does anyone desire to speak on this question of rigidity and elasticity of foundations of which the last speakers we have heard have just spoken.

Mr. n'Hoop. — I have an observation to make about the formation of streets. In all the French conclusions there is an affirmation which seems too absolute in the terms. Thus in the second French conclusion we read " Every time it is possible the road is laid on a concrete foundation ". I find it is too precise. Mr. MARIAGE by developing his proposition, has shown that this refers to asphalt paving and that a concrete foundation is necessary, but it cannot be said that it is necessary to make a concrete foundation everywhere.

Mr. MARIAGE. — Whenever it is possible from an economical point of view.

Mr. n'Hoop. — I believe in spite of that it is still too absolute or then, should be added : " in special cases " or " monolithic paving or concrete paving ".

It is very dangerous to use absolute terms for that would place us in a difficult situation with the Public Authorities. Thus, in the second French conclusion, I notice they cite too precise figures, in fact it is said " If there is but slight tramway traffic and the weight of the vehicles does not exceed five tons per axle, rails can be laid directly on the natural soil " and further : If the traffic is more intense, and if the weight is less than 7 tons per axle. I believe we are not able to cite such

precise figures, and I do not see any reason for emitting so categoric a proposition.

Mr. MAHIEU. — Your observation will have to be examined by the sub-committee.

Mr. LAGASSE DE LOCHT (Belgium). — I desire first of all to congratulate Mr. MARIAGE upon the excellent instruction he has given us. The sub-committee must take these considerations which he has stated into account; but it should be remarked that what was done in Paris may not be suitable for Brussels, or elsewhere especially for the local railways. There is here the economic side of the question which must be considered.

Mr. Fernand LAURENT (France). — I should like to make an observation, not from a technical point of view but about a question of wording and text which is important because it can give rise to misunderstandings. When reading the conclusions Mr. MARIAGE had only spoken of tramways on "roads"; in the text of the conclusions, I find the word "highways" more general whilst when reading the conclusions of the Spanish General Report, in n° 7, I find the word "streets"; also the intervention of Mr. LAGASSE DE LOCHT, has brought Paris and Brussels into the Question. A phrase must be found that distinguishes between tramways on tracks away from the street and tramways on the streets. We all agree that the construction of tramways on roads must be promoted as much as possible. On the other hand, the development of tramways inside the towns, is not only undesirable but also opposed to the exigencies and tendencies of modern traffic, which require the diminution of the number of tramways in the towns and even replacing them by the autobus. I should like the French and Spanish texts which speak of streets and urban tramways brought into agreement with the text of Mr. MARIAGE who speaks of roads.

Mr. MARIAGE. — I am going to reply to the observation which states that Brussels cannot be dealt with in the same way as Paris. Allow me to say that I have always spoken from an economic point of view. Brussels has given examples to Paris in the laying of ties. I believe then, if Brussels so desired it would do the same as Paris. They have all means at disposal at Brussels.

Will Mr. LAURENT allow me to say on his behalf that we are in agreement with respect to the development of tramways, but it is

not a question of developing the urban tramways. It is there a problem of renewals. It is not easy to suppress the urban tramways. If their development is not to be pursued their suppression encounters great difficulties. Now, at the time when it is question of the renewals of the line, the most modern methods should be studied.

Mr. DICENTA, *General Reporter*. — The track to be proposed as type could be a track on a rigid foundation, a certain suppleness and elasticity being realized by a special manner of attachment, to be studied, from the rail to the track, which does not mean that there are not excellent systems of elastic foundations. It is moreover for this reason that I have a particular conclusion (4) in accord with that of Mr. MARIAGE. I have determined the types for which this system of foundation can be used.

I repeat: the surfacing advocated as type should be that which utilizes the rigid foundation; but it does not follow that tramway lines on a elastic foundation are defective: the Belgian tramways, in a proportion of 75 % belong to this type and we all know they are models of their kind.

THE CHAIRMAN. — The observations presented by Mr. Fernand LAURENT, Vice President of the Municipal Council of Paris, do not refer to the technical question which we are discussing although the subject which it treats is most interesting, and it can and must be taken into consideration.

Mr. LAURENT says that in the Spanish conclusion, it is a question of streets but not in the French conclusion. It is there also a question of great cities like Paris and London, and, as a representative of one of them, Mr. LAURENT considers that it is for the special sub-committee, to draw up these conclusions under a form as clear as possible. The latter will have to take into account that it is not only a question of roads: It must not be forgotten then that it is necessary and proper to speak of streets of important towns. The proposal of Mr. LAURENT will be then sent back to the sub-committee, which will seek under which form it can give satisfaction in the sense indicated to a request which interests all the municipalities.

Mr. LAURENT. — Precisely.

Mr. DICENTA. — I must state that I did not have in view the laying of tramway tracks in roads in my report. This question

was discussed in preceding Congresses. The question asked to-day is more precise : it refers to the laying of rails attached to a foundation. Now, it is only exceptionally that roads are paved or asphalted. Also, I consider the proposition of Mr. LAURENT has a perfect right to enter into the list of questions submitted to Congress.

The tramways on routes, I repeat, were made the object of former studies in other Congresses ; perhaps it would be suitable to take up the examination of them ; I have not personally formulated any conclusion on this point for I consider it does not concern my subject.

Mr. LAURENT. — We agree. The only observation I have to make is that we cannot present a conclusion to Congress saying, categorically that the development of tramways must be encouraged.

Mr. MAHIEU. — I am of this opinion. There is a distinction to be made between the tramway tracks in the towns and outside the towns ; but it is not a question of conclusions tending to increase the number of tramways in the towns.

THE CHAIRMAN. — The technical question under discussion here does not only refer to roads but also to the construction of tramway lines inside the towns. The conclusion must embrace these two aspects. We then agree and we shall be able to pass to the following conclusion concerning the type of rails.

The reporter then resumed :—

Mr. DICENTA. — There is, on this subject, my seventh conclusion :—

" Seventhly. — Grooved rails must always be used in streets. The Vignole type must not be used except when the tramways occupy separate tracks or on highways.

" Hard steels must be used for their manufacture and the Sandberg method is to be recommended for hardening the heads of the rails.

" The weight of the cars and the intensity of the traffic must be taken into account when selecting the type of rail to be used ".

The French delegation expressed the same idea in the first paragraph of its third conclusion, which is thus worded :—

" The most suitable type of rail to be used in the streets whatever be their surfacing, is the grooved rail. The joints

should be whenever possible welded; if not, the fish plates should be long and of a section which will accurately fit the rail ".

In the Spanish report, there were added in conclusion (7) two paragraphs of detail, and when I say detail, I believe the indications which they contained on the hardness of the rail are not the less essential to it. This point does not figure in the French report.

Mr. MARIAGE. — The Spanish conclusions 7<sup>a</sup>, 8<sup>a</sup> are resumed in a single French conclusion. The Spanish conclusion 7<sup>a</sup> had also in view the hardening of the rails, the Sandberg process, which has moreover given good results.

In my opinion, it would be preferable to suppress the words " Sandberg process ", because I believe it is the rule in the conclusion of an International Congress, not to mention the name of such and such a special process.

Mr. BRESSEY. --- It is also the opinion of the British delegates that it is better not to mention in the conclusions of Congress, special processes of which we have not had long experience.

Mr. DICENTA. — In these conditions I accept the suppression of the words " Sandberg system ". It is clear that if I cited this process, it was in the intention of generalising under its name all the similar processes which can be used, and not to praise a speciality or the patent taken under this name.

Mr. MAHIEU. — Very well. We agree.

THE CHAIRMAN. — We have then finished with the seventh conclusion of the spanish report and we pass to the eighth.

Mr. DICENTA. -- Here is the text of this conclusion :—

" Eighthly. — As the joints of the rails are the weakest part of the track they must be made with the utmost care, long fish-plates with special screws and nuts being employed to prevent their loosening. Electric welding is also used with excellent results for joining the fish-plates to the rails ".

Up to there my conclusions are entirely contained in the second paragraph of the third French conclusion, which says : " The joints will be as much as possible welded otherwise the fish-plate used will have to be long and of a section adapting itself perfectly to the section of the rail ".

I speak then in my report of aluminothermic welding, I shall repeat here what I have already said about the Sandberg system : if I cite this process, it is not to advocate a system in itself or to defend a patent, it is because it is the most generally used ; but nothing prevents using an equivalent system.

All the papers have pronounced in favour of the welding of rails. Experience has shown me that in the urban lines the joints have never broken ; it is only on an extra interurban line comprising a length of 8 kilometers (1) of rail that two joints have opened. I believe then that we also agree in advising the use of alumino-thermic welding or any other equivalent process.

Mr. MARIAGE. — Yes, but we do not cite any in particular. (*Applause.*)

THE CHAIRMAN. — After what Mr. DICENTA has just explained to us agreement is reached on the conclusion and, with respect to the different methods of welding we shall refrain from naming one process rather than another.

We pass to the ninth conclusion of the General Report.

Mr. DICENTA. — Here is what I said :—

" Ninthly. — In special cases only, and when the tramway track is separated from the road, a pavement can be used for the former of less resistance than that of the latter, but the pavement of the track must have at least the same resistance if it is to be used by the general traffic ".

It is evident we have here a consideration of a general order. The case in view happens seldom ; but it will happen sometimes owing to the relative situations of the tramway and the street, the general traffic does not pass over the track : the surfacing of the track being always expensive, a surfacing not so costly can in this case be supplied for the track. The text of the French delegation does not say anything in this point. I agree that the conclusion under discussion having only particular cases in view, can be suppressed.

THE CHAIRMAN. — No opposition ? Let us pass to the following conclusion.

Mr. DICENTA. — Here is the tenth conclusion :—

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(1) 5 miles.



" Tenthly. — As it is essential for the proper maintenance of the track that the area immediately adjoining the rails and the pavement should be connected and protected and that the junction between both should be made as far as possible impermeable, the stone in macadam pavings must be rammed tight against the rails, which should be protected by two rows of setts laid as stretchers and headers ".

It is the system applied everywhere. It consists in the case of a surfacing of macadam or asphalt, to place one or two rows of setts on both sides of the rails. It is so generally adopted that it would be almost superfluous for the Congress to recommend its use.

The second part which corresponds to the first paragraph of the fourth French conclusion says :—

" In stone pavings it is advisable to use special setts at the junction and to fill with cement mortar, asphalt or pitch not only the joint between the rail and the setts but also those in the strips immediately adjacent or, still better, all those within the track zone, in order to prevent the infiltration of water ".

This point was not admitted in the text of Mr. MARIAGE, who suppressed what I said then :—

" If the setts used in the road are not very hard, porphyry or granite setts should be substituted for them at the sides of the rails ".

Here is the remark which will justify this conclusion : in the region which I know the best Valencia, a soft sandstone is used for the paving, and the vehicles in passing besides the tramway-tracks, make deep ruts : the sandstone usually employed should be replaced by a hard stone paving.

That is on the whole the object of the 10th conclusion.

Here is the eleventh :—

" Eleventhly. — In asphalt paving the zone immediately adjacent to the rails should be protected by placing courses of stone setts or wood blocks on both sides and filling the joints in a similar manner as described above.

" In some cases, if the width of the street permits of it, a break can be made in the asphalt surface of the roadway at the space between the lines and the adjacent zones, stone paving being substituted for it.

" In the case of wood paving the most suitable method of preparing and arranging the wood blocks in order to prevent the pressure of the latter from causing movements in the rails must be studied ".

The text of the French delegation contains the same idea :—

" In the case of asphalt roads, one or two rows of sets should be laid between the rail and the asphalt, jointed against the rail as mentioned above ".

Mr. BRESSEY. — These two conclusions raise certain technical questions. The British and American delegations would have some observations to make on this subject, but as it is only a question of particular points, they can be settled by the sub-committee to which we shall submit them.

Mr. BIJLS (Belgium). — I read in the Report of the Reporter General that special ingredients and cement mortar should be used in the paving along the joints. I consider these materials are not to be recommended, and I therefore propose to suppress them.

Mr. MAIHOU. — It is one of the question that can be discussed by the sub-committee.

Mr. LOPRENS (Belgium). — I believe, Gentlemen, that a technical question of this importance must be discussed in a general assembly and that the role of the sub-committee must be to revise, and not to make decisions. Otherwise, what would be the use of a Congress ?

Mr. MARIAGE. — I think in fact that it would be preferable to discuss here the question of a technical order raised by Mr. BIJLS in order that the sub-committee can draw up the conclusions after having ascertained the different opinions emitted by members of Congress ?

For my part, I consider that, for the paving, the best method consists of putting cement below and asphalt above. It is the result of personal experience but I believe the use of materials of which the report of the General Reporter speaks is not to be recommended.

Mr. MAYER (France). — I do not approve of the processes which have just been advocated. In my opinion and after experiments which have given good results, it is the use of sand which is the most suitable.

Mr. MARIAGE. — I consider the Congress cannot settle this question which moreover does not figure in the French conclusions.

Mr. DICENTA. — I believe that the joints should be filled not only in the two or three rows of paving adjacent to the rail, but also in all the width of the space between the rails. All the papers attach a capital importance, really justified, to the fact that the watertightness of the track be assured. How can we arrive at this result? One of the points where the water can penetrate is at the junction of the rail with the surfacing; it is then necessary to render this part watertight. The system is the same. For my part, I believe in filling in the joints with cement. It appears to me nevertheless very rational (one of the papers gives this indication) that the filling up of the joint be done with pitch or tar.

I considered that this point presented great interest; that is why I introduce it into my conclusion. I should be glad to see the idea propagated that there is occasion to assure the watertightness of the junction between the rail and the surfacing.

Mr. MAHIEU. — I see there is no agreement between different members of the delegations on the utility of various processes of paving. I believe consequently it would be better to postpone this question to future experiments. The only question under discussion is that of joints adjacent to the rails. There are two systems: the English system, with asphalt and the mixed system of Mr. MARIAGE with cement and asphalt, which was applied at Antwerp.

Mr. BIJLS. — In the conclusions it is not question of a mixed joint but a cement joint.

Mr. MARIAGE. — I spoke of a paving and in the conclusions this question is not spoken of, it is a question apart: it simply mentions the filling between the rail and the paving.

Mr. BIJLS. — It is not a joint; it is a filling.

Mr. MARIAGE. — Put a filling if you want to.

Mr. LAGASSE DE LOCHT. — Mr. MARIAGE is in my opinion too precise. I have not the intention of giving lessons to the sub-committee, but let them not enter too much into details on this question, of deciding whether the joints must be totally of

asphalt or cement. It is not our role. Let them not be so precise, for then we shall have the appearance of saying that Congress enjoins such and such a thing and that if we do not obey we are not up to the mark in science. I think it is better not to be so precise and that we should judge of the results of experience and especially from the financial point of view. Let us say simply that it is necessary to have watertight joints between the rail and the paving, without saying by what process.

MR. MAHIEU. — I am of Mr. LAGASSE DE LOCHT's opinion that the revising committee will have to seek for a more general formula which leaves the engineers more liberty.

MR. DICENTA. — I admit willingly that a certain latitude should be left in our conclusions with respect to the method of filling of joints and that will be no occasion to specify the method to be employed.

THE CHAIRMAN. — We are then in agreement; let us pass to the 12th conclusion.

MR. DICENTA. — Here is the twelfth conclusion :—

" Twelfthly. — As the noise and vibration caused by tram traffic are very disagreeable to the public it is necessary to use every effort to diminish them. From this point of view it is advisable to lay the line upon cross ties or elastic supports and, if the rails rest upon the concrete, to interpose between the latter and the foot of the rail a layer of asphalt or pitch.

" If the rails are not joined together by aluminothermic welding the joints must be made with strongly fastened fish-plates, it being preferable to effect this by means of electric welding.

" As noise and vibration increase in proportion as corrugations appear in the rails such wear should be combated by hardening the surface of the heads of the rails and filing them when occasion arises.

" At switches and crossings it will be advisable to use grooves of no great depth which will allow the flanges of the wheels to rest upon the bottom of the groove so that the running surface of the rim, which should be cylindrical, may not touch the detached ends of the crossed rails.

" Careful cleaning of the line and frequent lubrication of the rails at curves are operations which are necessary to diminish noise and vibration.

" For the same purpose improvements in the motors and gears of the cars should be studied ".

Mr. MAHIEU. — This conclusion seems to enter into very precise developments. It says that vibration must be diminished, and it passes in review the means to be used for this object. It would be preferable in my opinion to indicate that there is occasion to use all these special processes to avoid vibration but not to have an enumeration which might be considered as comprehensive.

Mr. DICENTA. — I willingly agree to the proposition of Mr. MAHIEU who on the whole finds his expression in the text presented by the French delegation (3°). This text expresses the same idea under a general form, without defining the means to be used.

Mr. MAHIEU. The sub-committee could try to find a suitable formula to be used to meet the common desire on which everybody seems to be in agreement. (*Assent.*)

Mr. LAGASSE DE LOCHT. — It is well understood that the sub-committee is going to deal with this question of suburban railways by having a very general point of view, for in numerous circumstances, reasons of economy or others are opposed to the construction of the line. Let them not be too precise.

Mr. MAHIEU. — Certainly. The Chairman has already said so.

THE CHAIRMAN. — Gentlemen, we have carried out well the task that was assigned to us at the beginning of this Congress. It is a great satisfaction for us to see that the predictions which I have had the honour of making you are for the most part realized. The conclusions which we have passed will have certainly a salutary influence on the development of roads. The satisfaction which we feel will be certainly increased if you recall the advice that I gave you to bring vehemence and ardour into the discussion.

I have found with pleasure that we have conducted our debates with the desirable ardour and vivacity : we must congratulate ourselves heartily upon it, is the best demonstration at once manifest and animated of the interest which has inspired our works.

We have also had the pleasure to hear the eminent engineers, who have put forward considerations of a capital importance :

but, especially, we have felt another 'subject of keen satisfaction : it is to have created ties of affection' and esteem between persons who did not know one another : this fact itself, is always agreeable and perhaps may have important consequences in the future.

We must bring back into our homes the profound conviction of work so praiseworthy accomplished by the International Congress of Roads. Its importance from the point of view of the development of roads and the organisation of our works will have been demonstrated once more.

We must address our sincere and affectionate felicitations, not only to the International Commission which has accomplished its role so well, but more particularly to each of the engineers assembled here with a special mention for the reporters who have so brilliantly fulfilled their task. Finally we must congratulate the representatives of Seville upon the aimable and attentive way they have received us.

On separating let all of us seek to take away the profound desire to meet once again in a new Roads Congress. (*Loud applause.*)

MR. MAHIEU. — I believe I am the interpreter of all of us in thanking and congratulating our President, who has been able in the course of the last three meetings to direct our deliberations with so much impartiality and courtesy. His technical knowledge and his ability to speak foreign languages have enabled him to conduct the debate with safety and to keep it within proper limits. (*Loud applause.*)

The questions dealt with were important, and it is certain that their solution may result in a great benefit to public finances in the different countries.

If great progress is going to be made we owe it for the most part to our Spanish colleagues, who in their General Reports, have been able to obtain from each paper the necessary elements for conclusions as concrete as possible. We have accomplished this object which was proposed at the present Congress, and I believe that in congratulating our President and our Spanish colleagues we but render homage to truth and justice (*Loud and repeated applause.*)

THE CHAIRMAN. — The meeting is closed.

(11,40 a. m.).

SECOND SECTION  
TRAFFIC AND DEVELOPMENT

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FOURTH MEETING  
Tuesday May 8, 1923

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4th QUESTION

The Development of Motor Transport

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*Chairman* : Mr. QUIJANO.

The meeting commenced at 9,45 a. m.

THE CHAIRMAN. — Persons more capable than I who, also, have the honour to be your hosts, have already welcomed you to this Spanish territory.

The meetings which commence to-day will be especially devoted to the study of the above and I hope that the co-operation of all will render more easy the work of the President, who relies on your moderation, and your zeal.

We are going without any other formality to proceed to the business of the fourth question considered by this Congress and entitled : "*Development of Motor Transport*".

Mr. SORRIBAS, General Reporter will now address you.

Mr. SORRIBAS. — In the first place, Gentlemen, I give a hearty and respectful welcome to all the members of the Congress who have honoured us with their presence at this assembly.

It is of very great importance and has an indisputable influence on the social economy and policy of every country.

It is also my duty to salute cordially the authors of the excellent reports who have treated the question of "The

Development of Motor Transport " and who belong to the following nations : Spain, United States, France, England, Italy, Holland, Switzerland and Czecho-Slovakia. Lastly it is a great honour for me to welcome the ladies who have honoured this meeting with their presence.

I regret, Gentlemen, not being able to develop the question which I have to treat to its fullest extent. I will however submit some short considerations on this subject.

The intensification of motor transports has been such that the circulation, which before the war in 1914 amounted scarcely to 2½ million vehicles for the whole world, approached in 1920 twenty two millions of which half belonged to the United States and the other half to the rest of the world.

In the United States in 1920 the number of motor cars was in the proportion of 1 of 11 inhabitants, in England 1 to 150, in Switzerland 1 to 151, in France 1 to 160, Belgium, Germany, Italy and the other countries following closely.

In the course of the year 1922 alone, the United States have manufactured about 7.000 motor cars a day of which about one tenth part represented motor lorries. It is easy to deduce that a considerable increase in motor cars has followed.

It is not only in Spain people they complain of the bad condition of the roads.

All the reporters of the various countries with reason complain of the fact that the improvement of roads has not kept pace with the increase in the number of motor cars. In the United States the proportion of increase of these vehicles has been 1.800 % while on the other hand the expenses for upkeep of the roads have increased only 400 % while last year a sum of 1.000 million dollars was allotted solely for the construction and maintenance of the routes.

We can state that the European Great War which has caused so much damage not only in the countries of the combatants but also in that of the neutrals has been the real cause of the development of the motor car industry. England in particular sent to the front about 250.000 vehicles, having to cover behind the army 6.000 kms. (1) of roads.

Italy sent to the front more than 150.000 vehicles with 100.000 chauffeurs, the consumption of petrol amounting to nearly 600 tons of petrol a day.

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(1) 3.725 miles.



Towards the end of the war there remained a considerable stock of motor cars which were sold at low prices; there were also a great number of experienced drivers and this has resulted in motor car being employed in all parts.

We know that animal traction can only compete with motors over distances of 1 to 15 kilometers (1) and only where the roads are bad. Once these are improved and especially if the lorries are fully loaded, it is certain that vehicles with animal traction cannot in any manner enter into competition with mechanical propelled vehicles.

In countries such as Italy, Switzerland and Spain where the economical and topographical conditions do not permit railways, it is clear that the automobile is going to solve the problem of rapid movement. That is why motor transport is of extraordinary importance.

From a social point of view also the motor car is of the greatest importance as it allows people living in large cities to return easily to the country as well as to enjoy the holidays.

The inhabitants of the country, the farmers also acknowledge the great advantages of motor transport for the motor car permits them to use the large markets, this vehicle serves them not only as an element of recreation but also as an instrument of the greatest use.

As regards public instruction, we can state that for the large nations such as the United States the motor car enables more than 2,000,000 children to be carried to about 212,600 schools. Besides it is the motor car which has permitted the schools to be supplied with suitable material and all the indispensable articles.

From the agricultural point of view, there is no doubt that the farming produce is thanks to the motor car transported from the centres of production to the consumers. A certain number of products such as milk, fruit, vegetables can thus reach the markets at any hour of the day and with all possible speed; a thing which is not possible by railway as special trains are not available. From this point of view the motor car is an ideal vehicle, it can leave at no matter what hour of the day or night to carry the goods to their destination. What we have said of fresh vegetables, milk, and fruit can also be applied to fresh fish.

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(1) 0.62 mile to 9.30 miles.

From the industrial point of view the motor car is of such importance that it permits the important manufacturing centres to be connected easily and speedily with towns situate at great distances. Thus land is cheaper and the conditions of life are also more economical, the inconvenience of distance being compensated by the use of the motor car.

In this manner the large towns can be suitably provisioned thanks to the use of the motor car. In what concerns the social life, the development of the use of the motor car is equally of exceptional importance. All the countries have recently taken up the question of " Roads " and the representatives of all the nations are unanimous in their opinion that the roads, in general, are not in the condition that could be desired.

Between each of the countries great differences exist in their opinions as to what the roads ought to be like. Each reporter, as is usual has given his experience of what exists in his country, those — of the north — speaking of curves having a radius of 30 metres (1) : others such as Holland — saying that they ought not to have a radius of less than 250 (2). In Italy, for example, you arrive at a radius of 10 metres. There is as it is easy to suppose, a great diversity.

However no doubt all are of accord to suppress all sorts of obstacles. For example, on the subject of level crossings, all agree to the necessity of suppressing these whenever possible, and in such cases, to insist upon giving a view sufficient to make it possible avoid all accidents. Almost all the reporters mention the need for a great visibility on curves so as to give a clear view for a distance of 100 metres at least (3).

In what concerns super elevation all agree to the establishment of an inclination on the curves to counterbalance the effect of the centrifugal force. This inclination will depend upon the conditions of the locus in quo for there are countries where they observe excessive speeds of 80 to 100 kms. (4) the hour. This inclination in such a case ought to be enlarged, but as I consider that the roads are made for vehicles of all categories, allow me to submit some conclusions having for their aim to give satisfaction to all requirements.

The gutters which cross roads constitute another obstacle and

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(1) 33 yards.

(2) 273 yards.

(3) 100 yards.

(4) 50 to 62 miles.

almost all the reporters are of opinion that they should be abolished, and if that cannot be done, the water courses should be placed in suitable channels.

As regards the width of roads there is almost general agreement to give the roads with heavy traffic, the greatest width possible and especially to try and separate the motor transport, animal traction, tramways and the movement of animals and pedestrians : in a word, to make reserved tracts for each of the different categories of traffic.

In what concerns the paving, and surfacing it is necessary to employ a material which is as hard and economical as possible preference being given to those which reduce dust and mud.

The members of the Congress have all read the resumé of the reports of all the countries. Taking into account the circumstances and particulars reported by each of them, I have established a series of conclusions which I am going to ask your permission to read.

In this problem on the " Development of Motor Transport " there are two essential factors to be examined : the *vehicle* and the *road*.

As regards the vehicle, endeavours should be made to make it as perfect and cheap as possible, so that it may be within the reach of everybody, for which purpose it is necessary :—

a) That Governments should encourage the manufacture of such vehicles by subsidising the constructors, so that they can make them by mass production, thus reducing the cost of raw materials and labour.

b) That in each country investigations should be made as to the best and cheapest national fuel, so as not to be dependent on foreign countries, a handsome reward being given to the person who solves this important problem and that of wheel tyres.

c) That in all countries the formation of Companies to carry on passenger and goods transport services should be encouraged and that they should be subsidised, the necessary guarantees being in proportion to the usefulness and economy of the services.

As regards the *road*, all engineers know that the most perfect is that which, whilst serving the greatest interests, is the shortest ; the cheapest to construct and maintain ; has the least pronounced

gradients and curves with the greatest radius; offers the fewest obstacles to rapid and free running; has the greatest width, so as to enable all classes of users to freely utilize it concurrently; and has the most resistant and durable pavement with the lowest cost of construction and maintenance, without dust, moisture, cracks, etc.

In order to approach perfection as nearly as possible it is necessary :—

a) To create in every country a body or organisation, which might be given the name of " Central Road Service " the object of which will be to establish fixed standards for the construction, improvement repair and maintenance of the roads, and to experiment with the various systems of pavings, so as to suggest them where they are most suitable.

This organization should work with the necessary technical and economic autonomy, so as to be able to fulfil its task properly.

b) To endeavour to bring about the disappearance within the shortest possible time of all single-axle animal-drawn vehicles used in inter-urban transport. Those which are to be tolerated should not be drawn by more than 2 horses tandem-wise, nor should tyres be used on wheels whose width is less than 8 cm. (1).

c) To abolish all level crossings on railways and to arrange those which must continue to exist, owing to special circumstances in such manner as to permit of visibility over a minimum distance of 150 m. (2) on each side.

d) To prohibit channels altogether; and when it is impossible to avoid them, the connections of their lateral branches with the bottom of the drain and with the gradients of the road, must be made with curves of large radius. The lateral branches must not have slopes of more than 5 in 100, nor a length less than the maximum length of the vehicles, also their bottom or lower part intended for drainage should be flat or slightly concave in shape, the whole of the surface to be paved or cobbled.

e) That the maximum gradients shall not have an inclination of more than 5-6 in 100, and that the radii of the curves shall not be less than 30 m. (3) in mountainous countries and

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(1) 3.15 inches.

(2) 164 yards.

(3) 32 yards.

100 m. (1) in flat or medium flat ground, with the necessary super elevation on the outer part, well adjusted to the straight portion.

f) That the width of the surfacing or pavement intended for use by wheeled traffic shall not be less than 5 m. (2). Where it is a question of dealing with very frequented roads, special tracks should be laid down on both sides for animal or horse-drawn vehicles and tramways, and for pedestrians and bicycles, the tracks to be separated from the roadway properly so-called by means of kerbs.

g) That pavements of ordinary macadam shall only be used on roads where there is little heavy traffic and which are not much used, as also on tracks for pedestrians and cyclists and animal-drawn vehicles. On all other sections special pavements must be used, either *rigid*, such as pavings with or without foundation and cement concrete either reinforced or not reinforced; or *elastic*, with asphaltic or bituminous materials, or *mixed*, as local and economic circumstances suggest. Conditions as to traffic resistance being equal, preference should be given to pavements that have a certain elasticity.

h) That for special pavements intended for motor traction, the camber shall be reduced to the minimum compatible with the draining off of rainwater, the difference in level between the centre and the edges not exceeding 2 in 100.

i) That at all cross-roads clear signposts shall be placed in order to enable the routes to be followed without hesitation, and that these signs shall be lighted during the night wherever possible. The road edges must be protected by railings, embankments or wheelguards at the most dangerous points.

j) That at all curves and elevated parts of roads on gradients there shall be a visibility on each side of 100 m. (3) minimum length. This distance must be taken into consideration at all points of the curves at a distance of 1 m. from the concave inner edge and at a height of 1 ½ m. (4).

k) That all indications and general signals on the road shall be the same in all countries, and that the direction of movement,

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(1) 100 yards.

(2) 5.5 yards.

(3) 100 yards.

(4) 1.6 yards.

either on the right or the left of the road, shall be made uniform in all countries, the former being preferred.

1) That telephones shall be fitted up for public use at all shelters for roadmen. And that on roads where there is a great volume of tourist traffic the building of good inns for travellers and of stations for goods shall be encouraged.

These conclusions, Gentlemen, I have formed in taking the contents of each of the reports into consideration. I have made a sort of resumé of all what has been said in these various reports. But as in spite of that certain of my conclusions touch on other questions which are before the Congress, the French delegation has submitted an amendement tending to condense what I have proposed and to co-relate this to the other questions in order to avoid duplication. I agree entirely and willingly to these amended conclusions which I am now going to read :—

*1st Conclusion.* — Experience gained in nearly every country, having demonstrated the incontestable utility of public motor vehicle services to replace, for the carrying of persons and the distribution of products, railways and tramways wherever these latter cannot penetrate and also for all those cases where the establishment and working would be too onerous, it is important that Governments endeavour to promote the development of motor transport by, if necessary, granting subsidies which will ensure its existence and which should be in proportion to the services which it is called upon to render.

*2nd Conclusion.* — To encourage this development, an effort must be made, to lower the cost price. With this view, it is especially recommended that researches should be continued for a carburant which will allow the driving of these vehicles in each country under the most economical conditions possible.

*3rd Conclusion.* — Motor vehicles, while increasing in number must not be a cause of exaggerated destruction to the roads they run over. It is essential that they be adapted to the methods of construction and maintenance of the roads, which, moreover, are continually being improved. From this point of view, it is important to encourage, in the construction of these vehicles, the study and the realisation of all improvements susceptible of attenuating the effects of rapid running or of heavy traffic on the public ways. There may be cited, amongst

others, as recommendable in this regard sundry processes already tried which effect tyres the method of suspension, braking on the four wheels, buffers, etc.

*4th Conclusion.* — Traffic on roads and highways should be facilitated by the suppression, whenever possible, of obstacles such as level — crossings, trenches, etc., which are a cause of inconvenience not only for automobilists, but also for all users of the road.

The principal desiderata which may be formulated for the improvement of the lay out of roads, outside of the special surfacing of the carriageways, treated in question I and II, consist in the reduction of steep gradients, the provision of curves with a large radius, good visibility, convexity as reduced as possible, complete signaling of directions, distances and obstacles, taking as basis, in all countries the rules and signs adopted by the International Conference of the 11th October 1909.

As I have said before and as you know, these conclusions, conform to those which I have made but shortened and condensed in form. I again declare my full approval. (*Applause.*)

A secretary read the 1st Conclusion proposed in French and English.

*1st Conclusion.* — Experience gained in nearly every country, having demonstrated the incontestable utility of public motor vehicle services to replace, for the carrying of persons and the distribution of products, railways and tramways wherever these latter cannot penetrate and also for all those cases where the establishment and working would be too onerous, it is important that Governments endeavour to promote the development of motor transport by, if necessary, granting subsidies which will ensure its existence and which should be in proportion to the services which it is called upon to render.

Mr. d'Aoust (Belgium). — I wish to make two remarks on the proposition which has just been read. The one bearing upon the basis of the proposition, the other on its form.

In what concerns the basis, I consider that the proposition surpasses the limits of the decisions to be taken by a Congress when it asks the Governments to subsidize motor transport. I believe that we can ask, in place of this subsidy that the motor transports should have, even by special roads, the greatest faci-

lities provided for their expansion, and that an endeavour should be made to obtain a network of roads which will permit the development of traffic.

In what concerns the form, I suggest that the word "*undesirable*" be substituted for the word "*onerous*" which better expresses the proposed object in view.

Mr. CHAIX (France). — Gentlemen, it seems on the contrary that the term "*undesirable*" does not conform to our ideas, it has a sinister meaning character which Mr. d'Aoust certainly has not in view.

Our draft concerns especially the obstacles which are met with where it is proposed to establish railways in cities, on account either of the construction of the roads or the inconveniences to traffic. It has also, a general sense applicable to all forms of transport : we have especially referred to expenses, in speaking of what is "too onerous" with the desire to point out that new tracks could be a great inconvenience for traffic whilst the cost of laying-down would a great hindrance to economy.

We desire the indication to remain in the form indicated and are of opinion that to maintain the text proposed by us in agreement with the General Reporter without introducing the word "*undesirable*" because the word "*onerous*", answers perfectly to the general idea which we wish to express.

With respect to the other remark of Mr. d'Aoust, I think the question must be looked at from a general point of view and consequently each Government must be solicited to improve the traffic according to the means which it is possible for it to use.

That may be accomplished first by putting the roads in such a condition that they can render all the service that it is possible to obtain from them and then, and if necessary, by granting for the improvement of traffic, assistance, even pecuniary which is necessary to accomplish this task.

As to the charge that we could exceed the rôle of a Congress, I believe that if we wish to find and propose to the Governments the means of obtaining from the roads the greatest utility which they can give, it is also necessary and natural that we should suggest to the Governments the means of doing so with facility.

THE CHAIRMAN. — Mr. d'Aoust proposes the following modification : at the fourth line where it is said... "and the working of these would be too onerous" put "the working of these would hardly be desirable". In addition at the penul-



timatè line where it is said... " granting them subsidies if needs be ", we should put " by granting if needs be the concession of a system of roads permitting of its use ".

Mr. D'Aoust. — On the word " undesirable " I do not insist, I simply emphasize that my remarks were intended to render the sense of the conclusion more general since the word " onerous " seems to be limited to indicating the material difficulties.

On the second point, I do insist particularly because there seems to be a misunderstanding. In speaking of " use ", I mean the free use of the road, which we have got and which I think very important because that will give us great facilities.

I ask then that the words " *the use of a road system allowing their expansion* " be substituted for the two last lines of the first conclusion or added to them.

Mr. GELINCK (Holland). — Gentlemen, I should like to add to the first conclusion after the words " the Governments " the words *and public administrations* " which would give more fullness to the object which the conclusion is desired to attain.

Mr. LE GAVRIAN (France). — We accept the addition proposed by Mr. GELINCK. As to the free use of the public roads, this exists in principle and there is no need to consider more fully the local difficulties which appear to especially concern Mr. D'Aoust.

Mr. D'Aoust. — I also approve of the addition of Mr. GELINCK. As to the difficulties which certain local authorities may have regarding the traffic of motor-cars and to which I wished to draw attention, the addition in question and the commentary which Mr. LE GAVRIAN has just given gives me satisfaction.

THE CHAIRMAN put to the vote the first conclusion in the following form :—

I. Experience gained in nearly every country has demonstrated the indisputable utility of public motor vehicle services, firstly for the purpose of passenger and goods transport in districts unserved by railways and tramways, and secondly, in all those cases where the establishment and operation of railways and tramways would be too costly; it is therefore important that Governments and Local Authorities should endeavour to promote the development of motor transport by granting subsidies, where this is necessary, so as to ensure the

provision of transport services — the subsidies being proportioned to the services rendered.

It is carried.

THE CHAIRMAN. — We pass to the 2nd conclusion which reads as follows :—

II. — To encourage this development, an effort must be made, to lower the cost price. With this in view, it is especially recommended that researches should be continued for a carburant which will allow the driving of these vehicles in each country under the most economical conditions possible.

MR. CHAIX (France). — Gentlemen, a certain number of members of Congress have suggested replacing the word " carburant " by another word which expresses better the requirements of all automobiles; there are some in fact which do not use it.

We propose to replace this term by the words " the source or sources of power " in order to prevent any misunderstanding which might be created.

THE CHAIRMAN. — Gentlemen, have you any observations to make? Nobody desiring to speak, I shall put the 2nd conclusion to the vote with the modification proposed by Mr. CHAIX.

The 2nd conclusion thus modified is approved.

THE CHAIRMAN. — We pass to the 3rd conclusion as follows :—

III. — Motor vehicles, while increasing in number must not be a cause of exaggerated destruction to the roads they run over. It is essential that they be adapted to the methods of construction and maintenance of the roads, which, moreover, are continually being improved. From this point of view, it is important to encourage, in the construction of these vehicles, the study and the realisation of all improvements susceptible of attenuating the effects of rapid running or of heavy traffic on the public ways. There may be cited, amongst others, as recommendable in this regard sundry processes already tried which effect tyres the method of suspension, braking on the four wheels, buffers, etc.

MR. GELINCK (Holland). — I should like to see inserted instead of " braking on four wheels " simply " brakes " in order to give a more general sense to our conclusion, since there are vehicles which have less than four wheels.

Mr. MARIAGE (France). — Mr. President, I think that it is important that the conclusion should say something more than the mere word "brakes" should draw attention to the need for brakes on wheels other than automobiles in order to spare the roads which are being badly damaged through the partial use of brakes. However I think the very proper remark of Mr. GELINCK could be taken into account by wording the conclusion in this way: "...brakes on the greatest possible number of wheels".

Mr. CHAIX (France). — I support the observation and proposal of Mr. MARIAGE.

Mr. d'Aoust (Belgium). — Since we are in agreement on this point I wish to point out that the expression "*four wheels*" seems to have a restricted or limited sense, there are vehicles with three wheels, but there exist also lorries which have more than four wheels. I support the proposal of Mr. MARIAGE but I suggest not to consider the brakes on the wheels, but the brakes on the axles.

Mr. CHAIX. — To brake on the axles is the same as to brake on the wheels and moreover in referring to the brakes on wheels there is useful indication given to builders. I propose to speak of the brakes, and specially those which act on the largest number of wheels possible.

Colonel DE BRUYN (Holland). — Is it necessary to go into details about the brakes?

THE CHAIRMAN. — I am going to put the conclusion to the vote with the amendment as proposed, by Mr. CHAIX and which appears to me not to raise any opposition.

The 3rd conclusion thus amended is adopted.

THE CHAIRMAN. — We will now pass to the 4th conclusion.

IV. -- Traffic on roads and highways should be facilitated by the suppression, whenever possible, of obstacles such as level-crossings, trenches, etc., which are a cause of inconvenience not only for automobilists, but also for all users of the road.

The principal desiderata which may be formulated for the improvement of the lay out of roads, outside of the special surfacing of the carriageways, treated in questions I and II, consist in the reduction of steep gradients, the provision of

curves with a large radius, good visibility, convexity as reduced as possible, complete signaling of directions, distances and obstacles, taking as a basis in all countries, the rules and signs adopted by the International Conference of the 11th October 1909.

Mr. Alex DAHL (Denmark). — As a representative of the Royal Automobile Club of Denmark, I propose to replace the last words " The rules and signals adopted by the International Convention of Oct. 11th 1909 " by those of " The rules and signals which are and will be adopted by the Recognised Association of Automobile Clubs ". This will enable us to make modifications to the rules made by the Convention of 1909 and of which certain are already recognised as desirable.

Mr. CHAIX (France). — Gentlemen, as delegate of the Automobile Club of France, I can only be flattered by the proposal of Mr. DAHL. But I believe however that I must vote against it. The diplomatic conference of 1909 (of which I have happy personal memories, accomplished an international task which has been sanctioned by the adherent Governments. The conclusions adopted by it have only been modified by a new international diplomatic conference. It is undesirable, that the established rules should be modified too often. Nevertheless a time will come when it will be advisable to do so: at such time the views and suggestions of the Recognised Clubs of the Motor Car Association will serve as a basis and will have great weight with the deliberations of the Governments taking part in the Conference. But our actual Congress has not the power to cancel the agreements of 1909 and to substitute another Authority. It is in this spirit that I ask you to accept the text of the conclusion.

Mr. DAHL. — Taking note of the remarks of Mr. CHAIX, I do not insist and I withdraw my amendment.

Mr. d'Aoust. — We also, in our country, desire the application of the resolutions of the diplomatic convention of 1909, and I am of the same opinion as Mr. CHAIX on this point.

Mr. MARIAGE (France). — When will our new Conference take place ?

Mr. CHAIX. — The Government which presides over our present discussion will take care, to have the views expressed

in favour of a new Conference made known but we ourselves cannot, we have not got the power to fix the date of this meeting.

Mr. d'Aoust. — Agreed. Gentlemen, I now wish to propose an amendment to the 1st paragraph of the 4th Conclusion, and to add after the words " a source of inconvenience not only to motorists " the words " and a public danger ".

Mr. LE GAVRIAN (France). — It is a good idea — I propose to say " inconvenience or of *danger* not only to motorists ". (*Signs of approval.*)

THE CHAIRMAN. — Gentlemen, you have heard the discussion : " We propose to add, to the 1st paragraph, the words " or of danger ". — We have also considered whether it is necessary to revise, at the end of the last paragraph, the words " International Convention of 1909 " and to substitute " the International Association of Automobile Clubs ". I have heard it expressed that it might be possible to consider in the deliberations the idea of a new diplomatic conference in order to formulate further orders to those made in 1909 and to put those made in 1909 more in harmony with the present requirements and to express the views of the Association of Automobile Clubs. Up to now there has been no time to modify this last part of our 4th conclusion. Consequently unless any other member of the Congress wishes to speak I am going to ask for the resolution to be approved.

In order to avoid all ambiguity, I am going to read the whole of this conclusion, with addition of the words " or of danger " in the 1st paragraph. (Done.) The conclusion is thus adopted.

THE CHAIRMAN. — We have concluded the discussion of the conclusions presented on the 4th question. I am going to invite two of our colleagues who have asked to be permitted to submit to the Congress some personal remarks to speak on the subjects which relate to the 4th Question.

Mr. W. W. CROSBY (United States), then read the following.

*Grades.* — An authoritative expression as to the now logical maxima for highway grades under modern circumstances would be a most valuable result.

In the professional practice of the writer the old grade maxima of four to eight per cent (as developed from theories and experiments with animal-drawn vehicles on non-bituminous surfa-

cings) have seemed to fail to satisfy the needs of the present situation.

The writer believes that some experiments have been made and that considerable data exists — more or less scattered perhaps — from which some fairly reliable conclusions might be drawn as to the reasonable maximum grades that now might be permitted under motor-driven traffic. Further, a recognition — in the form of the now acceptable maxima — of the change that has occurred in traffic conditions would result in considerable economies.

In this connection, the writer would like to suggest that so far as possible, the consideration of speed, or at least of excessive speed, be left out of the calculation, notwithstanding the arguments that will probably appear for the inclusion.

This Association of Road Congresses has perhaps already gone too far in its expressed adoptions out of consideration for speed-maniacs.

Conclusion : That the heretofore accepted figures for maxima grades on highways may, if desirable, for economy of construction or for other good reasons, properly be doubled in cases where automobile traffic is the important sole one.

THE CHAIRMAN. — We thank you for your communication. It will be inserted in the report of proceedings.

MR. PYKE JOHNSON (United States) reads the following about the condition of Highway Transport in America.

Figures received at the Road Congress in Seville show that during 1922, the number of motor vehicles in the United States reached a grand total of 12,233,000 vehicles of which about ten per cent were motor trucks. During the same period the rural highway expenditures were estimated at \$767,000,000 while the taxation of the motor vehicles approximated \$340,000,000.

The production of vehicles in 1922 was more than 2,500,000 or the largest production in the history of the industry and there are indications that 1923 will see a much heavier output. Highway experts estimate that the road outlay will have to be continued at the rate of 1922 for at least ten years in order to provide a completed system of main highways.

These figures are cited simply to show the extent to which highway transport has grown in the short period of its existence. It must be obvious that with this new fast and heavy

traffic have come entirely new problems in finance, construction, design and operation and the most extensive research is necessary to get at the facts.

The situation is one which cannot be met by mere propaganda or opinions. The motor manufacturer can not afford to enter into heavy capital investments of his design is economically impractical. The state highway commissioner cannot afford to build highways which will not stand the strain of justified traffic. The tax economist cannot afford to impose taxes which will dry up rather than increase the needed revenue. The user must know costs. The community can not turn to the motor vehicle unless it can be assured of continuous service.

Facts are necessary in all these fields and in America every effort is being made to obtain them.

During the past years, numerous conferences have been held between the groups interested in transportation including the government, industrial, educational, agricultural, scientific and transportation authorities.

These meetings have served to bring out essential fields where knowledge is lacking and accordingly, numerous studies have been set up in related fields under organizations such as the Bureau of Public Roads, T. H. Mac DONALD, Chief, the National Automobile Chamber of Commerce, Roy D. CHAPIN, Chairman Highways Committee, and a great many investigations in the universities, stimulated and coordinated by the highway advisory board on highway research, of the National Research Council of which Dr. W. K. HATT is director.

A few of the points on which research is now being undertaken may be cited here and it is hoped that they will prove of sufficient interest to merit the readers of this report in going to original sources for more detailed information :—

1. Every state should prepare a highway budget which should be taken to be the sum total of all highway expenditures in that state each year. The Bureau of Public Road is conducting an exhaustive study into all highway operations to determine these facts.

2. The highway budget should be brought into relation with other state expenditures for education and related social activities. The subject has been taken up by numerous tax organizations and citizens organizations but apparently will be left to local determination because of widely varying needs.

3. There should be four highway systems, interstate, state, county and local, coordinated under engineering control. The Federal Aid act provides for the first two and a strong educational effort is being made by numerous bodies such as the Bureau of Public Roads, the Highway Education Board and others to bring about the correlation of all systems necessary to eliminate waste.

4. The character, extent and order of highway improvement should be dependent upon relative future traffic requirements. Studies of fact in this field are now being made by numerous state highway departments in cooperation with the Federal Government. Similarly studies are being made into relative costs of construction and maintenance of different types of surfacing, and the economic limit of traffic at which improvement becomes desirable.

5. The character of financing should depend upon the stage of highway development. In the initial stage, long term bond issues appear practical. In the second stage, in the main current finances appear sufficient when coupled with bond issues to cover special projects. In the third stage, current finances seem to be sufficient. These points have already been made the subject of extensive surveys to determine probable life of the road and a fair division of costs as between capital and operating expenses. The Bureau of Public Roads is continuing these studies, and conferences have been held with the Investment Bankers Association, the Automobile Chamber and other groups.

6. Highway improvement should be paid for by its beneficiaries. These may be roughly divided into two groups, general and special. The first includes those benefits which go to society as a whole such as the national defense, the port office service, and the broad social questions of better communication. The second include the benefit served to urban property, to agricultural property and to the motor user. The exact relations between these is being determined through exhaustive studies in Wisconsin, Connecticut and elsewhere by the Bureau of Public Roads. Supplementary cooperative studies between this Bureau and that on Agricultural Economics are under consideration. Still further studies are contemplated by the Bureau in cooperation with state highway departments.

7. Highway, railway, waterway, and electric transportation should be correlated. In this field, an investigation has been



instituted by the Chamber of Commerce of the United States in which all of the groups mentioned are cooperating together with others in an effort to arrive at the place to be occupied by motor transport, the influence it exerts on railway terminal costs, on city development and the further development of our rail, water and electric services. The Bureau of Public Roads, the Bureau of Railway Economics, the Interstate Commerce commission, and numerous other public and quasi public research bodies are cooperating in this study.

8. City and regional planning is an essential development which should precede highway development. This subject is being taken up by government authorities by organizations such as the National City Planning conference, the Automobile Chamber and definite research studies are now under way in many American cities to get at the underlying facts.

In the fields of construction, correlated studies are being made by federal and state authorities to determine the various stresses and strains exerted by varied types of transport. Similarly studies have been instituted under the direction of the Highway Advisory Board cooperated in by government and automotive experts to determine the facts underlying the relation of road and vehicle, the effects of road improvement upon vehicle cost, the effect of road improvement upon vehicle cost, the effect of changed vehicle design upon road costs, and the economic theory of highway location.

In the field of regulation, studies are being made to determine effects of overloading, of vehicle use under adverse climatic conditions of speeding and similar conditions. There is a mutual agreement limiting maximum loads to 28,000 pounds on four wheels as well as a general belief as expressed in similar agreements that the state highway officials should be given wide powers in the regulation of traffic. The need for centralized authority is always stressed.

Safety is a paramount issue and is being approached through the medium of large national organizations such as the National Safety Council, and the Highway Education Board.

Fundamentally the belief is that the problems of highway transport can only be solved by research and education, hence every effort is being made to get the full cooperation of the university and institutional educational authorities fully interested in a teaching and studying these problems.

THE CHAIRMAN. — We thank Mr. PYKE JOHNSON for his communication which will be inserted in the report of proceedings.

Gentlemen, we have accomplished the programme which was set us this morning.

In conclusion I should like to thank you for the cordiality and the broadness of ideas which have prevailed in our discussions and which have greatly facilitated the task of your president.

The meeting closed at 11,30 a. m.

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SECOND SECTION  
TRAFFIC AND DEVELOPMENT

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FIFTH MEETING

Wednesday May 9, 1923

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5th QUESTION

General Traffic Regulations

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*Chairman : Mr. QUIJANO.*

The meeting opened at 9,30 a. m.

THE CHAIRMAN. — MR. DE ALBACETE, General Reporter, will now address you.

MR. DE ALBACETE, *General Reporter*. — Gentlemen, the organisation of our Congresses seems to make it unnecessary for me to read the general report; it has been printed and distributed to you; it is so much the more unnecessary as the Congressists have had beforehand every facility to become conversant with the reports which they have been able to study.

The subject we have to deal with comprises a multitude of important questions of the greatest interest. These questions moreover present serious difficulties due to the fact that they concern both the technical and administrative organisation of each country. There are certainly points on which it is impossible to arrive at a uniform solution; it appears to me however logical to disengage those on which all the countries must seek to realize uniformity.

It is in this spirit that I have prepared the conclusions which I am going to read, commenting on them, if there is occasion, while doing so.

" 1. In the present state of the roads and in view of the diversity of their characteristics in different countries, the limiting dimensions of vehicles cannot be defined in a general manner, but it is desirable that their maximum width, between the most extreme points, should not exceed 2,50 m. (1). The special regulations of each locality may contain such rules as may be suitable and applicable to the nature of its roads ".

" 2. Whilst no knowledge is available of the result of the experimental studies made in many countries as to weights and speeds on different kinds of pavements, the following table may be adopted in a provisional sense, which table bears in mind the weight of the vehicle, the weight corresponding to the heaviest loaded axle, the nature of the pavements and the kind of tyres ".

TOTAL WEIGHT of the LOADED VEHICLE	WEIGHT on the MOST HEAVILY LOADED AXLE	SPEEDS IN KILOMETRES PER HOUR				
		Rigid tyres on all pave- ments	Roads with ordinary metalling		Roads with special metalling	
			solid rubber tyres	pneumatic rubber tyres	solid rubber tyres	pneumatic rubber tyres
3001 to 4500 kg. (3 t. to 4 t. 5)	2001 to 3000 kg. (2 t. to 3 t.)	12 km. (7,5 mil.)	25 km. (15,5 milles)	40 km. (25 milles)	30 km. (19 milles)	45 km. (28 milles)
4501 to 8000 — (4 t. 5 to 8 t.)	3001 to 5500 — (3 t. to 5 t. 5)	10 km. (6,2 mil.)	20 km. (12,5 milles)	30 km. (19 milles)	25 km. (15,5 milles)	40 km. (25 milles)
8001 to 11000 — (8 t. to 11 t.)	5501 to 8000 — (5 t. 5 to 8 t.)	8 km. (5 mil.)	15 km. (9,5 milles)	25 km. (15,5 milles)	20 km. (12,5 milles)	30 km. (19 milles)
Over 11000 — (Over 11 tons)	Over 8000 — (Over 8 tons)	5 km. (3 mil.)	10 km. (6,2 milles)	15 km. (9,5 milles)	15 km. (9,5 milles)	20 km. (12,5 milles)

I must point out that French delegates have proposed two amendments in respect of this second conclusion: one consists of allowing for "ways of suspension" as to which studies are now going on and which are likely to influence the regulation of speeds; the other provided for speeds in the table and which they propose to reduce slightly. This is evidently excellent for roads. These same delegates propose also to add a note to the table according to which an increase in the speed of vehicles serving for transport of persons may be permitted, in cases where the competent authorities would so desire and where the state of the road surface allows of such increase. I agree entirely with the French delegation with regard to these modifications, and for

(1) 8 feet, 3 inches.

my part I accept these amendments without any discussion which, as I have already said, only mean a very slight change in the figures in the table.

I shall continue to read :—

" 3. In so far as experience and fresh investigations do not advise the variation thereof, there should be maintained the conclusion of the 2nd Road Congress held in Brussels which proposed the maximum pressure of 150 kg. (1) per centimetre of width of tyre and the formula  $c = 150 \sqrt{d}$  when the diameters of the wheels exceed 1 metre ".

" 4. As the regulations on lighting, running and driving licences, passing of frontiers and commercial transport of travellers (for which it is necessary to have agreements of an international character which the Congress cannot impose), could be the same in all countries, an International Conference should be held in which one sole Regulation may be agreed upon which would apply to all the agreeing countries or to those which adhere to the stipulated convention. At this conference suitable measures as to identification plates could also be adopted ".

" 5. a) If the topography of the ground demands it all vehicles should be provided with a brake.

" b) Motor vehicles must have at least 2 systems of brakes with drive and independent transmissions and these brakes must be sufficiently powerful to stop the vehicle on the steepest gradients.

" c) It is absolutely prohibited to use plates, or devices with clamps or nails which may ruin the pavement as also to lock the wheels by stopping them or to make use of objects which drag on the surface of the roads.

" d) All animal-drawn vehicles intended for transport service must be fitted with at least one brake, capable of stopping it.

The French delegation proposes that the paragraph *d* be merged into paragraph *a* the main points being identical and I entirely accept the amendment which is as follows :—

" a) All vehicles intended for transport of persons and goods must be provided with brakes, if the topography of the land requires it ".

" e) In hilly countries ordinary vehicles must be fitted with a mechanism, independent of the brakes so as to stop backward movement on gradients ".

"6. Notwithstanding the practical difficulty of regulating the traffic of pedestrians and loose animals on roads, the special regulations must contain measures and penalties for infringers so as to compel the former to move along the roads without being an obstacle to the transit of vehicles, and the drivers of the animals to control them in such a way as to permit the passing of same ".

" 7. It is of paramount importance that in the shortest possible time the direction of traffic should be made uniform in all countries thus doing away with the divergencies between travelling through towns and the open country ".

Such are the conclusions I propose. In conclusion, I tender my hearty greetings to my colleagues present at this meeting.

THE CHAIRMAN. — Gentlemen, you have heard the report of the General Reporter and his conclusions.

The discussion is opened. I read the first conclusion :—

" 1. In the present state of the roads and in view of the diversity of their characteristics in different countries, the limiting dimensions of vehicles cannot be defined in a general manner, but it is desirable that their maximum width, between the most extreme points, should not exceed 2.50 m. (1). The special regulations of each locality may contain such rules as may be suitable and applicable to the nature of its roads ".

Mr. W. W. CROSBY (U. S. A.). — The human family continuously embraces a certain type of individuals, ignorant or contemptuous of consideration for their own welfare or that of others; of laws, natural or statute, or of restraints other than those imposed by superior physical forces. We cannot, beyond a certain point, ignore the existence of these recalcitrants, and at this point in our affairs, possibly the serious consideration of the type of motorist to whom laws enacted for his own good as well as that of the large majority of road users are mere " chiffons ".

The use of most public roads is limited, properly by a maximum speed for the automobile. But as I have asked

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(1) 8 feet, 3 inches.

before, " Why a Speed Limit ? " almost everywhere ? Few motorists seem to regard it unless it be as a " pace-maker " except where speed traps are suspected or known to exist. That a speed limit may have been established, in many cases, and be necessary for their own and others safety does not seem to occur to them.

Take for instance the case of a railway crossing a roadway at the same grade. Is not complete control near this point of the more responsive and lighter machine proper and in fact, imperative ? Yet, regardless of sign-post, ordinances, and natural laws or logic, far too large a proportion of motor-drivers dash up to and over these crossings at unreasonable and often disastrous speeds.

Again, take the case of a thoroughfare through a parked residential section where frequently a school or other congregation of children daily occurs. Too high a speed by an inconsiderate chauffeur so frequently results disastrously — generally to others than himself — that mere fines or jail sentences seem inadequate to enforce respect for laws made by men.

In the case of the " grade-crossings " a certain glimmering of respect for physical consequences to themselves seems to moderate the aspirations of some speed maniacs at these situations, and a suggestion is thereby given to those who share the responsibility for making highways efficient and safe. A form of construction may be adopted for the highway which will emphasize in the heart of the chauffeur the fear of the physical consequences to himself sufficiently to compel the appropriate speed for such localities to be observed automatically.

In 1906, I seemed to be forced, as Chief Engineer of the Maryland Road Work, to help protect the children and other pedestrians on the main street of Chavy Chase, Maryland, from speeding automaniacs, and I found that the construction of a few shallow gutters across the macadam of the roadway at intervals of a hundred yards or so, as required, answered the purpose effectively. (See Report on the " Highways of Maryland " 1905-1908 inclusive).

Recently a similar suggestion has been made to the Legislature of the State of Tennessee for requirement by law. (See " Bulletin " P. I. A. R. C., 19 — p. 246).

I wish to commend this idea of resorting to physical means for the restraint of speeds on highways to within reasonable limits where necessary, at it seems to me is quite often the

case, and to suggest the proper scientific development of the idea illustrated above.

It would seem entirely practicable to work out a design for either a " hump " or a cross-gutter that would be safe and comfortable enough in passing over it at speed of from 20 to 25 miles per hour; that would give a severe warning at 30 miles per hour; and that would be disastrous at over 35 miles per hour.

The reduction in numbers of speed maniacs is not undesirable, even by suicide.

Mr. AMUNATEGUI (Chili). — In America different attempts have been made to restrict excessive speeds. Every hundred yards a kind of trench has been placed so as to prevent excessive speed.

Mr. CHAIX (France). — The suggestion of our colleague Mr. W. W. CROSBY porposing the adoption of a material restriction of speed, is contemplated by our Delegation in the sense of facilitating traffic and has already been discussed in the preceding meeting. Interesting as it is it does not seem possible to incorporate it in our Conclusions, because it belongs to former debates.

Mr. GELINCK (Holland). — I should like to propose introducing in the 1st conclusions at present under discussion, a modification after the words " particular regulations " viz., to suppress the word " locality ".

Mr. GONSELL (Great Britain). — The American and English delegations have not had time enough to thoroughly study these conclusions. However I should willingly agree with Mr. GELINCK and I should ask in addition what is meant by " particular regulations ". Is it a question of local regulations? It is often very difficult to know them and, on the other hand, it is desirable to seek to have general regulations with which every body should be familiar.

A SECRETARY. — One of our American colleagues points out that the width of the vehicles should be specified by local authorities in particular regulations, for there are countries, such as Norway which have roads for vehicles of 2 m. 50 (1),

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(1) 8 feet, 3 inches.



and others which permit the use of vehicles measuring up to 5 metres (1). The general dispositions which this Congress can adopt must be left to the initiative of the authorities of each country as to the choice of the means which the natural conditions of the soil permit them to use.

Mr. AMUNATEGUI (Chili). — Mr. GODSELL does not propose any modification for the first conclusion but simply asks what the words " local regulations " signify.

Mr. DE ALBACETE (*General Reporter*). — The proposition of Mr. GELINCK, supported by Mr. GODSELL would be evidently the best which could be realized. There is no doubt that if all countries could only have a single regulation, it would only be necessary to suppress the word " particular "; not only could the principle be laid down, but also the general Regulation could suffice. But it is easily understood that this proposal is very difficult to put into practice as there are so many different Administrations and regulations. Also I consider the Congress can only adopt a resolution having a general character since in saying " particular regulations " it is not specified whether they are to be enacted by the State, or by the Municipalities. Once again I declare this resolution would be most expedient but it is not possible and in my opinion it is not possible for the Congress to adopt it.

We could however suppress the words " localities " as Mr. GELINCK proposes.

Mr. D'Aoust (Belgium). — I consider this is a fundamental question. It is absolutely necessary to prevent that by the words " particular regulations " the Public Administrations and especially the small districts, should be permitted to regulate the traffic according to their ideas which would interfere with measures of general application. I call the attention of Congress to this point and I propose therefore that the words " particular regulations " be omitted from the Conclusion.

Mr. CHAIX (France). — I call the attention of my Colleagues to the difficulties an entirely general resolution on this point caused during an international meeting of road traffic which was held in Paris two years ago.

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(1) 16 feet, 6 inches.

We get up against objections and a strong resistance if we want to define the exact width of roads in various countries.

Because of that we wished to fix merely the maximum width of vehicles at 2 m. 50 (1). But the special conditions prevailing in each country always must be taken into account, for regulations can only be effective when they are appropriate to circumstances; and that is why, when thinking of countries, which like Norway, just spoken of by our American Colleague, have roads which can be widened, we found entirely satisfactory the last part of the first conclusion which says :—

" The special regulations of each locality may contain such rules as may be suitable and applicable to the nature of its roads ".

The dimension of 2 m. 50 (1) would be a maximum width which the particular regulations could only reduce.

Mr. GODSELL. I would like to replace the last sentence of the conclusion 1 by the following :—

" It would be suitable in this respect to have a uniform regulation except in exceptional cases, where special regulations would be necessary ".

Mr. CHAIX. — It would be necessary to establish that the particular regulations must be applied in exceptional cases.

Mr. GODSELL. — Agreed.

Mr. ISACCO (Italy). — It is necessary in any case to limit the powers of district administrations in order to prevent the latter from adopting prescriptions which would be too restrictive and which might hinder the traffic : the particular regulations enacted by minor authorities in these matters ought to be submitted for the approval of higher authorities.

Mr. LE GAVRIAN. — The powers of the districts are fixed by law; it would be difficult to modify these.

Mr. HANSEZ (Belgium). — I should like to make an addition to what Messrs. CHAIX and GODSELL proposed. We are here to establish something which can be accepted by all the coun-

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(1) 8 feet, 3 inches.

tries. With this object in view I propose to add after the words : " exceptional cases " the words " considering the width of the roads ". It is thus that we should define the scope of the particular regulations, simply to the advantage of roads which are not sufficiently wide.

I have nothing to object as to the figure of 2 m. 50 (1) to be adopted for the width of the vehicles, and since it is a question of the maximum width of vehicles and not of the minimum let the State, the district or the province be called upon to regulate the question, the width of the vehicles could be reduced, but only in exceptional cases and by reason of the width of the road.

Mr. CHAIX. — But we specify it more completely by saying " in exceptional cases ".

Mr. D'Aoust. — I should like to sound a word of warning which I believe to be very important : it is the necessity of preventing the passing of numerous local regulations.

Mr. CHAIX. — All that is safeguarded by the indication of " in exceptional cases ".

Mr. HANSEZ. — I insist on this point and consider that it is necessary to put " *owing to the width* " without which I could not vote for the conclusion.

Mr. CHAIX. — Eh, well, we could thus draw up the conclusions :—

" 1. In the present state of the roads and in view of the diversity of their characteristics in different countries the limiting dimensions of vehicles cannot be defined in a general manner, but it is desirable that their maximum width overall should not exceed 2.50 m. (1). In exceptional cases special regulations may be imposed adapted to the nature and widths of the roads ".

THE CHAIRMAN. — I am going to put this text to the vote as it seems to satisfy the various speakers who have taken part in the discussion.

The conclusion thus worded is adopted.

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(1) 8 feet, 3 inches.

THE CHAIRMAN. — Before passing to conclusion 2, a telegram sent by H. M. the King and communicated to us by the General Committee of the Congress is going to be read.

Mr. AMUNATEGUI reads in Spanish the following telegram which is immediately translated in English and French :—

“ My hearty thanks for the telegram which you have sent me in the name of the International Congress of Roads; I beg you, when transmitting my sincere thanks to the members of Congress to salute them in my name, and to tell them how sincerely I wish that their task may meet with every success. I am especially happy to wish them a hearty welcome in Spain and in this beautiful city, where I do not doubt they will find the hearty welcome such as deserve all those who have co-operated in a work of such importance for the progress and prosperity of the people. I shall be grateful if you will inform the Delegates that I also express my wishes for the prosperity of the countries they represent and for their personal welfare. — ALFONSO ”.

*(The reading of the telegram is greeted with loud applause.)*

Mr. CHAIX. — Gentlemen, permit me to be the interpreter of all the delegates present in this hall to tell the Government how deeply we are moved by the telegram of the King of Spain. We have been received in this city under the most charming conditions and we desire that H. M. the King should know how much we appreciate and are moved by this welcome.

I beg you, Mr. President, to transmit to H. M. the expression of our gratitude for his great kindness and our most profound respect. *(Loud applause.)*

THE CHAIRMAN. — We are now going to discuss the 2<sup>nd</sup> Conclusion which, with the amendments proposed by the French Delegates and adopted by the General Reporter, reads thus :—

*Conclusion 2.* — Until the results are known of the experimental studies being pursued in different countries concerning the weights, the methods of suspension, and the speeds, on different types of roadways, it would be possible to adopt provisionally the following table, which brings in the total weight of the vehicle, the weight of the most heavily loaded axle, the nature of the surfacing of the road, and the nature of the tyres of the wheels.

TOTAL WEIGHT of the LOADED VEHICLE	WEIGHT on the MOST HEAVILY LOADED AXLE	MAXIMUM SPEED IN KMS. PER HOUR					
		RIGID RIMS	ORDINARY ROADS			SPECIAL ROADS	
			Elastic tyres			Elastic tyres	
			Ordinary	Pneu- matic		Ordinary	Pneu- matic
3,001 to 4,500 k. (3 t. to 4 t. 5)	2,001 to 3,000 k. (2 t. to 3 t.)	12 km. (7,5 miles)	25 km. (15,5 miles)	35 km. (1) (22 miles)		30 km. (19 miles)	45 km. (28 miles)
4,501 to 8,000 (4 t. 5 to 8 t.)	3,001 to 5,500 (3 t. to 5 t. 5)	8 km. (5 miles)	20 km. (12,5 miles)	30 km. (19 miles)		25 km. (15,5 miles)	40 km. (25 miles)
8,001 to 11,000 (8 t. to 11 t.)	5,501 to 8,000 (5 t. 5 to 8 t.)	5 km. (3 miles)	15 km. (9,5 miles)	20 km. (12,5 miles)		20 km. (12,5 miles)	30 km. (19 miles)
Over 11,000 (Over 11 tons)	Over 8,000 (Over 8 tons)	5 km. (3 miles)	8 km. (5 miles)	10 km. (6 miles)		15 km. (9,5 miles)	20 km. (12,5 miles)

(1) When it is a question of vehicles for the transport of persons, this speed of 35 kms. might be increased, without however exceeding 40 kms., if the local authorities deem that the solidity of the soil of the road and the method of suspension of the vehicle render this increase acceptable.

Mr. DE BRUYN (Holland). — The figures inserted in the two first columns establish a kind of relation between the total weight of the vehicle and the weight on the most heavily loaded axle but the table does not take into account vehicles with multiple axles. Why not rely solely on the weight of the most heavily loaded axle? This would lead to the abolition of the first column.

Mr. W. W. CROSBY (U. S. A.). — I would point out that in the construction of vans in the United States 75 % of the total weight bears on the back axle; but in many cases the weight on this axle attains 90 %. The trials made in our country have not resulted in obtaining certain resolutions as to the relation to be established between the total weight and the weight on the most heavily loaded axle. We consider it dangerous to even propose a conclusion, and we should prefer not to see it mentioned at all. Under these circumstances I should suggest to suppress not only the first column of the table, but the entire table.

Mr. CHRISTENSEN (Denmark). — Gentlemen, we find in our country that climate has also a considerable influence as to the resistance of the roads; the limits of weight and speed must take the climate into consideration. (*Assent.*)

Mr. HANSEZ (Belgium). — The question of the limitation of weight and speed has a particular importance for the preser-

vation of roads. Therefore, I am not of Mr. Crosby's opinion and I consider that it is necessary to maintain the table and its first column.

The figures which are proposed to us are nearly the same as those which were adopted at the International Conference of Road Traffic held by the Automobile Club of France in 1921.

We, in Belgium, have tried since then to diminish the speed of heavy vehicles especially when they have no elastic tyres.

I must insist on this point, that the first column of the table remains as it is. In fact one can easily ascertain the weight of a whole vehicle whilst to ascertain the weight on the different axles is a much more complicated affair.

Mr. MARIAGE (France). — In my opinion, the limitation of speed ought to be made chiefly on the basis the weight on the most laden axle, otherwise illogical results will be arrived at. A vehicle weighing in all 7 t. 500 of which the most heavily laden axle carries 5 t. 500 could run at 26 km. (1) per hour, whilst a vehicle of 8 t. 500 with the most heavily laden axle bearing 4 t. 500 could only run at 15 km. (2) per hour.

Mr. GODSELL (Great Britain). — With respect to the figures as to speeds inscribed in the table, I should prefer that there be fewer categories and that the differences made between them should be greater.

Thus for the rigid rims, the two first lines in the table could be united at a common speed of 10 km. (3).

Also a difference of between 45 and 40 km. (4) an hour appears to me to be insignificant and an average figure could be substituted; the Note at the bottom of the table would be suppressed.

Mr. CHAIX (France). — Let us not forget that, in this section, we are looking for progress to be realized in the working of vehicles; now this progress is summed up in a single word " speed ". This must studied closely while taking care that it does not become a destructive element both for roads and vehicles, that is why we have presented this table with the detailed figures which it comprises.

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(1) 16 miles.

(2) 9.3 miles.

(3) 6.2 miles.

(4) 22 and 25 miles.

Mr. D'Aoust (Belgium). — There is also the question of vehicles towed by tractors which is not included in the table.

THE GENERAL REPORTER. — I think we should confine ourselves to-day to ordinary vehicles, to general cases, and to lay down general rules. The particular case of vehicles drawn by tractors could be studied at a future Congress.

In reality, in determining the permissible speed at the present time, as rightly remarked, the reciprocal reaction of the vehicle and the surface of roads must always be taken into account. Now, in all countries there are still many road surfacings which are not satisfactory.

On the other hand to suppress entirely the limitation of speed as was suggested, would simply end in allowing complete liberty to the Manufacturers of vehicles and consequently in contributing to the destruction of roads.

Temporary measures but having a general character should be adopted, limiting these speeds as much as in view of existing conditions, as with respect to the construction of vehicles.

That is why I insist that you accept the table presented to you, it being understood that these rules have a temporary character until more information is available, and until we can find out what is the ideal road.

Mr. W. W. Crosby. — If the table must be maintained, I should like to make again an observation. We hardly like having a rule comprising too large a number of exceptions and I should like to suppress the *Note* which is at the bottom of the table. The exception which it contains refers only to a difference of 5 kms. or 3 miles an hour, a difference which is really difficult to estimate when the vehicles are in motion.

Mr. CHAIX. — We think on the contrary that this difference may be very important, since it relates solely to heavy vehicles serving for the transport of persons, such as the omnibus.

Mr. D'Aoust. — The table specifies the different speeds according as the vehicles run on ordinary roads or " special roads ". What must we understand by that? Is it a question of the entire road, foundation and surfacing, or only of the surfacing?

Mr. LUYSEN (Belgium). — How will these two categories be defined?

Mr. CHAIX. — The special road applies to a road constructed with a view to supporting heavy and rapid traffic. The other roads have an ordinary surface. The word " road " must comprise the whole foundation and surfacing.

Mr. D'Aoust. — I should also like to know if in speaking of local authorities your conclusion relates to central or district authorities.

Mr. CHAIX. — Let us replace if you wish the words " local authorities " by " competent authorities ". (*Assent.*)

Mr. VALSINGER (Sweden). — I consider that a limitation of speed according to the weight is necessary, but I find that the figure in the table are too high; these speeds will destroy the roads at least the Swedish roads.

If I am not mistaken, the majority of the Delegates to the International Conference of Road Traffic, held in Paris in 1921, expressed the same desire, and it was decided that the table in question should be sent out for consideration and study by the various Road Administrations in order to arrive if possible, at a general standard which was very desirable in order to facilitate the international traffic of industrial vehicles.

Until the results of the experimental studies which are being carried out at the present time in various countries concerning weight, etc., are known, I cannot see the necessity of adopting, from now on, the figures of the table in question.

Mr. CHAIX. — I think I can reassure Mr. VALSINGER on this point by recalling that the figures of the table represent the maxima; on the other hand, as the General Reporter has said, it is a question of temporary figures which could be revised later when the studies now going on will be more advanced.

Mr. CHRISTENSEN. — Is it admitted that the difference of climate will be taken into consideration?

Mr. LE GAVRIAN. — Yes, that has been decided upon just now: the words are " and in taking the climate into consideration ".

THE GENERAL REPORTER. — I agree, and I propose adopting the text of the 2nd Conclusion with this addition, and without changing the figures of the table, but in replacing there the word *metalling* by the word " road " and in the *Note* the words " local authorities " by " competent authorities ".



THE CHAIRMAN reads the 2nd conclusion with the modifications indicated by the General Reporter.

This text is adopted.

THE CHAIRMAN. — We pass now to the third conclusion prepared by the General Reporter.

His text is read :—

" 3. In so far as experience and fresh investigations do not advise the variation thereof, there should be maintained the conclusion of the 2nd Road Congress held in Brussels which proposed the maximum pressure of 150 kg. (1) per centimetre of width of tyre and the formula  $c = 150 \sqrt{d}$  when the diameters of the wheels exceed 1 metre ".

None of the congressists wanting to speak this conclusion is approved without discussion.

THE CHAIRMAN. — The General Reporter is going to read his Conclusion N° 4.

" 4. As the regulations on lighting, traffic and driving licences, passing of frontiers and commercial transport of travellers (for which it is necessary to have agreements of an international character which the Congress cannot impose), could be the same in all countries, an International Official Conference should be held in which one sole Regulation may be agreed upon which would apply to all the agreeing countries or those which adhere to the stipulated convention. At this conference suitable measures as to identification plates could also be adopted ".

Mr. HART (Great-Britain). — We are quite willing to accept this conclusion.

Mr. HANSEZ (Belgium). — I also agree on the main point, but I should like to modify certain terms. The conclusion contains an enumeration of points to be settled, license to drive, lighting, etc. I consider this dangerous, for it might hamper the action already taken in certain countries : for instance it might lead to the introduction of an obligatory driving license, in countries where this obligation does not at present exist.

I propose to suppress the enumeration of lighting traffic and driving license, passing of frontiers, and commercial trans-

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(1) 330 lbs.

port of passengers " and to put in place of that "*Regulations relating to traffic* " and to add "*according to the conference held in 1909 in Paris* ".

Mr. CHAIX (France). — I see no objection to suppress the enumeration, and put in its place "*Regulations on national and international traffic* ".

As to the suggested International Conference to be created, it must be made clear that it will have the character of a diplomatic conference because it will then be binding on the Governments which take part in it, whilst an ordinary conference may not have any practical results. I propose to suppress the word " official " and to replace it by the words "*international diplomatic* "; I should then be of opinion that this conclusion occupies the first place among all those which we are examining to-day.

Mr. D'Aoust. — I support this suggestion.

THE GENERAL REPORTER. — I accept the amendments proposed by Messrs. HANSEZ and CHAIX in the form which the latter proposed; the conclusion thus modified would at the head of the list instead of N° 4 and it would be worded thus :—

" 1. As it is agreed that traffic regulations should be uniform in all countries, an International Diplomatic Conference should be held to determine standard regulations applicable to all the participating countries. At this conference suitable measures as to identification plates could also be adopted ".

It is understood that such a Conference similar to that held on 11th October 1909, will take place when clauses then decided upon could be revised.

THE CHAIRMAN. — I put conclusion N° 4 thus modified to the vote.

This conclusion is approved.

We shall now pass to conclusion N° 5, which comprises several new paragraphs *a*, *b*, *c*, *d*, *e*.

THE GENERAL REPORTER. — I would remind you that the text of paragraphs *a* and *d*, as I had drawn them up were made the object of an amendment of the French delegates, tending to make them into one, and I have agreed to this new text, which is as follows :—

Every vehicle *serving for the transport of persons and of*

*goods*, must be supplied with a brake, if the topography of the land requires it.

Mr. GODSELL. — I consider that every vehicle should have a brake whatever be the topography of the land on which it is to run.

Mr. CHAIN. --- Paragraph *b* obliges all motor vehicles to have brakes, which will satisfy Mr. GODSELL.

As to the animal drawn vehicles, which are not called upon to travel in different parts, why wish to force them to have brakes if they remain in a flat country?

In any case brakes can not be imposed on agricultural machines!

THE GENERAL REPORTER. — I am in favour of retaining the words " if the topography demands it ".

THE CHAIRMAN. — I put paragraph *a* to the vote. Approved.

THE GENERAL REPORTER. — We pass to paragraph *b*, thus :—

" *b*) Motor vehicles must have at least two systems of brakes with independent operation and transmission and these brakes must be sufficiently powerful to hold the vehicle on the steepest gradients ".

This new paragraph is adopted without any observations.

THE GENERAL REPORTER reads paragraph *c*, thus :—

" *c*) The use of plates or of any devices with studs or spikes which may ruin the road surface should be prohibited, also the locking of wheels or the use of any devices which skid on the surface of the road ".

Mr. PAGOLA (Spain). — I should not like the prohibition to be absolute; with the gradients of 12 degrees which we find in the Basque provinces, the regulation could not be applied.

THE GENERAL REPORTER. — Mr. PAGOLA alludes to braking shoes. I consider that, at the present time, vehicles can be provided with brakes powerful enough to render the use of braking shoes not indispensable.

The use of braking shoes is a mere habit which we should try to do away with; it is not a necessity. In the province of Madrid, in fact, slopes of 12, 14, and even 16 are found, and shoes are not used anywhere I request therefore that the text be maintained. (*Assent.*)

THE CHAIRMAN. — Paragraph *c* is approved. The paragraph *d* was amalgamated with paragraph *a*; we then pass to paragraph *e* :—

" *e*) In hilly countries vehicles must be fitted with an appliance, acting independently of the brakes, which will prevent them running backwards on gradients ".

No observation being made, this is approved.

THE CHAIRMAN. — We pass to the 6<sup>th</sup> Conclusion which reads as follows :—

" 6. Notwithstanding the practical difficulty of regulating the traffic of pedestrians and loose animals on roads, the special regulations must contain measures and penalties for infringers so as to compel the former to move along the roads without being an obstacle to the transit of vehicles, and the drivers of the animals to control them in such a way as to permit the passing of same ".

MR. GODSELL (Great Britain). — As I have already said in connection with the first conclusion, the particular regulations concerned must be *national* regulations and not any which the local authorities may decide upon.

MR. LE GAVRIAN. — Yes, it would be better to avoid all ambiguity, to suppress the word " particular ".

THE CHAIRMAN. -- Is the conclusion N° 6 approved under these conditions ?

It is approved.

We pass to the 7<sup>th</sup> Conclusion. This conclusion is worded thus :—

" 7. It is of paramount importance that in the shortest possible time the direction of traffic should be made uniform in all countries thus doing away with the divergencies between travelling through towns and the open country ".

MR. GODSELL. — Having regard to the fact that we have previously voted, relative to the holding of a diplomatic Conference in order to make the regulations uniform, has the conclusion n° 7 really any interest ?

THE GENERAL REPORTER. — The Diplomatic Conference will have for its object the unification of rules which can be applied internationally.

Unfortunately the unification of the direction of traffic does not seem to be a subject that, for the time being can be made subject to an international solution.

The conclusion N° 7 is confined to the direction of traffic within the limits of a country, and an agreement on this point will be a very important result. There is no duplication between the 7th Conclusion and the conclusion to which Mr. GODSELL alludes.

Mr. CHAIX (France). — I should like to remark that this unification exists already within the limits of some countries, in France, for instance. I propose to say "abolish the differences which are met with in this respect in certain regions of the same country".

THE CHAIRMAN. — If there is no opposition to this modification, the conclusion N° 7, thus amended, will be adopted.

Mr. MINCHERMER (Poland). — Concerning the unification of direction, I think it interesting to inform the Congress of what has been done in Poland :—

"Up to 1921 on the roads in Poland, the crossing of the vehicles took place on the right hand, and overtaking on the left, in the greater part of the territory (total 389,000 square km.) (1) but in the country subject to the Austrian domination (78,000 km. square) (2) the contrary was the custom.

"On 12th November 1921 the law of 7th October 1921, relative to the utilisation of public roads was promulgated. It came into force on February 12th 1922.

"The article 6 of this law prescribes keeping to the right on all roads in Poland: without any exception even in the towns in which the tramways keep to the left.

"That is why it became necessary to change the direction of the traffic in one fifth of the territory (78,000 km. sq.) (2) containing two big towns — Krakow and Lwone — Cracovie and Leopold or Lemberg — having systems of electric tramlines of a total length of 16 km. 924 (3) and 33 km. 459 (3) respectively.

"The adaption of these tramway lines to the new direction of traffic necessitated work which was completed in less than 9 weeks at Lwone and less than 4 weeks at Cracovia, and from

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(1) 150 257 sq. miles.

(2) 30 129 sq. miles.

(3) 10.5 to 20.8 miles

the summer of 1922, the tramways and vehicles ran on the right of the road. No accidents happened during this transitory period.

" The rural population, outside the great towns mentioned naturally, find it difficult to get accustomed to the new direction of traffic, but the heads of cantons and the police take advantage of every occasion (fairs, fêtes, etc.) to inform the population of the rules relating to the crossing of vehicles (right) and overtaking (left) of vehicles, moreover signposts have been put up, with inscriptions, near the large bridges and at the entrance of localities, etc. ".

THE CHAIRMAN. — We thank you for your communication.

Mr. GIRADO (Argentina). — I ask for permission to go back a little and say a word about the 4th question.

I should like under the form, of a resolution, to add to that proposed by the General Reporter SORRIBAS, amended by the french delegate the following :—

" To create among all nations, an organisation which could be called the " Central Office of Roads " possessing financial and technical autonomy, the object of which will be to establish rules for the construction, mending, remaking and upkeep of national inter-provincial or inter departmental roads.

" This office to be able to impose such notwithstanding the existing powers of Administrations concerned ".

I formulate this proposition because in my country, the Argentine Republic, which is a federal state, there are always differences and troubles between the national and provincial interests when it is a question of roads.

Mr. MAHIEU, *President of the Roads Congress Association*. — It is a very important question, but one which depends on the sovereignty of each country. I do not think then that we can here discuss the resolution of Mr. GIRADO. But it will appear in the report of the meeting, and each member can if he thinks fit communicate it to his Government.

Mr. Samuel HILL (United States). — Gentlemen, I desire to say how much we Americans, appreciate the hospitality which we are now receiving at Seville.

We should have liked this Congress to have taken place in the United States, or at least the next one to take place there for I

have hopes that our Government will not delay in becoming a member of the International Association of Road Congresses. I hear that an invitation from an other nation has arrived, and perhaps in consequence we must postpone the time when we may receive you in America. But I have confidence that the time will come; we have worked hard and are still doing so to improve our roads, and that may interest you.

Mr. MAHER. -- Mr. HILL, we thank you for your communication and indeed we hope shortly to count the Government of the United States among our adherents, and to be able to consider holding one of our future Congress in America.

THE CHAIRMAN - Gentlemen, we have finished the order of business. There only remains for me the duty of thanking you and of closing the meeting.

(The meeting closed at 12.40 p. m.).

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SECOND SECTION  
TRAFFIC AND DEVELOPMENT

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SIXTH MEETING

Friday May 11, 1923

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6th QUESTION

**The problem of Traffic on congested Roads  
and Streets of Towns**

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*Chairman* : Mr. QUIJANO.

The meeting opened at 9,55 a. m.

THE CHAIRMAN. — Mr. MARTINEZ, the General Reporter, will address you.

Mr. MARTINEZ, *General Reporter*. — The study of the problem of traffic on Congested Roads and Streets of Towns which is the object of the 6th Question, has been regarded by all the Reporters whose reports I have had the honour of examining as one of the most important, if not the most important of all those submitted to the Congress.

All the Members of the Congress have read these reports, they also know the summary which I have prepared; I need not therefore speak any further on these but can pass on, without losing any time, proceed to the discussion of the conclusions.

This question is not only exceptionally interesting, it is of vital importance for the progress of the nations; it is a question



of life and death. I believe this is the occasion for quoting Shakespeare : " To be or not to be ".

A few remarks would not be superfluous in order to make you understand the reason why I have shown myself so severe and so inflexible in my report.

This reason you will find in the terms themselves in which my report has been worded; I cannot do better than to refer you to it (see especially the pages 2, 3, 4). As for me I should be greatly disappointed if nothing was done at this Congress to put an end to the present state of things.

The reports submitted supply valuable information. In order to bring the study of this problem which my colleagues have kindly confided to me, to a successful issue, I have proceeded to make extracts from the most interesting parts of the reports and have analyzed them without losing contact with their authors, in order to give full justice to their ideas and propositions. I shall try to restrain myself in my subject, by observing faithfully the maxim, which in the story of Don Quichotte, Cervantes puts in the mouth of his character Master Peter, when the latter addresses the lad who operates the marionettes of his theatre : Simplicity, little one, do not lose yourself in the clouds; all affectation is vicious. (*Applause.*)

After this first part of my summary and before starting on the discussion of the conclusions, I express my affectionate greetings to all members of Congress and to the ladies who during these few days have been the grace and ornament of the city. I place at their feet all the flowers, all the colours, and all the perfumes of these gardens of Seville, unique in the world.

Here we are then able, it seems to me, to begin the examination of the conclusions which I have prepared.

I am going to read successively the two first conclusions : The French delegates have proposed drawing them up under one form, slightly different, in order that they should form a single conclusion. I make no objection to it.

Allow me however to explain to you why I thought I ought to give to the 1st conclusion the form which I have given it :—

" 1° Both drivers and pedestrians concerned in traffic disregard the regulations and orders which are at present in force and issued by the authorities for the facilitation of traffic. *That is the general complaint of the reports submitted on the 6th Question.* "

It is properly speaking not really a conclusion : it is a preliminary declaration which has only one object : that of justifying the use of the energetic measures to which I alluded just now, and which are absolutely indispensable, for, if the regulations are not observed to-day, it is necessary that they be observed in the future.

" 2° In ordinary circumstances the present regulations are adequate to remedy traffic congestion and all that is required is goodwill on the part of drivers and pedestrians, in the absence of which the authorities should act with all energy in imposing the deserved penalties for infractions of the regulations, *which is the only way to overcome disobedience.* "

The next which is proposed unites these two paragraphs in one which is worded thus :—

" In ordinary cases, the actual regulations, if properly applied, are enough to cause the obstruction of the traffic to disappear. When good will on the part of drivers and pedestrians is wanting, it is necessary that the police authorities should possess the means of enforcing respect of the regulations and inflicting the punishment that each kind of breach requires "

Mr. MASSARD (France). — I wish to thank the General Reporter for the interesting work which he has just presented us. I also wish to thank him for having accepted the amendment proposed by the French delegation : it is not question of a very important alteration, all we wanted was to contract the wording much as possible.

Mr. HANSEZ (Belgium). — We have heard the proposition of the French delegation with interest, but at first sight, I do not approve of its form. Indeed it suggests that the Congress intends to declare that the regulations at present in force are adequate. It may be so in France, where the traffic is generally important, that the latter is perfectly regulated ; but we are here to submit propositions and to take decisions applicable to all countries ; now I cannot affirm that in our country, in Belgium, the regulation of traffic is adequate. Consequently, I should like to see an amendment to the French text, as follows :—

" In ordinary circumstances and in spite of the insufficiency of existing present regulations, it appears that these, if properly applied, should be sufficient, etc... "

What I desire, is to point out that while taking steps to see that the regulations be observed, it is necessary in many countries, to think of improving them. Keeping to one direction, for instance, which is in force in your country, is unknown in mine; moreover it is not universally adopted, no more than the giratory movement in special places : now the adoption of measures of this kind is necessary, if one wants to bring about a traffic system which is irreproachable. It is with a view of coming to a practicable result that I ask for the addition of these few words to the proposition of the French delegates.

Mr. D'Aoust (Belgium). — The French delegation has noticed a certain contradiction between conclusions N° 1 and N° 14 of the General Report. Moreover the amendment proposed for the conclusion N° 1 seems to render the conclusion N° 14 superfluous. Nevertheless I would accept it, with the wording of Mr. HANSEZ.

Mr. HART (Great-Britain). — The British delegation is not satisfied with the sentence " In ordinary circumstances the present regulations are adequate to remedy the congestion of traffic and all that is required is the goodwill of the drivers and pedestrians ". The British delegation would willingly see the modification of the first two conclusions in accordance with the wishes of the Belgian delegate.

Mr. MASSARD. — The French delegation does not see why satisfaction should not be given to the request of Mr. HANSEZ, with a view to bringing about an improvement in countries where the regulation of traffic is not adequate.

The suppression of conclusion N° 14 would be more serious and it seems to me impossible to contemplate it. There, where the regulations are not adequate, it is necessary to modify them or to perfect them.

Mr. MARTINEZ, *General Reporter*. — The report which I have had the honour of reading to you was as I have already pointed out inspired by a fixed determination for strict regulations.

But I declare myself ready to accept these suggestions.

Mr. HART. — The British delegation also accepts this proposition.

Mr. D'Aoust. — I point out again that the conclusion N° 14 which is very important, seems to render the amended conclusion N° 1 superfluous.

Mr. LE GAYRIAN (France). — No; the 1st conclusion points out the insufficiency of these regulations : it is a point on which we all agree. The 14th conclusion has quite another object in view : it indicates that it is necessary to perfect and improve these regulations.

THE CHAIRMAN. — I put to the vote the fusion of the first two conclusions and the amendment of Mr. HANSEZ under the following form :—

" 1. — In ordinary cases and in spite of the insufficiency of existing regulations, it appears that these, if properly applied, should be sufficient to avoid congestion. When goodwill on the part of drivers and pedestrians is wanting the Police Authorities should possess the means of enforcing suitable penalties which each infringement deserves. " (Adopted.)

The General Reporter reads at once the conclusion N° 14, which will become the second, and the text of which is as follows :—

" 14 (1). — It is absolutely necessary to draw up new police regulations, their provisions being made uniform so as to render their international application possible, *and the principle must be followed of making them as few in number as possible, very concise and extremely simple*, because the variety of those at present in force makes their imperfections manifest, or at least shows that there is not yet sufficient definiteness in this connection to obviate uncertainties in their application. "

Mr. MASSARD. — I consider that the foregoing completes perfectly the first conclusion and that its adoption consequently appears indispensable. There are countries where the drivers must keep to the right; others on the contrary where they must keep to the left; certain countries, as Mr. HANSEZ has just pointed out to us, do not yet know the system of one direction only. Therefore the conclusion N° 14, which prescribes the perfection and the improvement of the regulations, with a view to bringing about an international unification which could render great service in all the countries, is the necessary complement of the preceding conclusion.

Mr. REES JEFFREYS (Great-Britain). — On behalf of the British delegation I wish to declare that we entirely approve of

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(1) 2nd of the adopted conclusions.

the conclusion N° 14 in the form in which it is worded. We would not like to see it modified.

THE CHAIRMAN. — I find there is agreement as to the 14th conclusion being placed in the second position and that its wording be preserved. (Adopted.)

MR. CHAIX (France). — I propose that we now discuss conclusion N° 15 so that it may be placed immediately after the conclusions which have just been adopted. (Approved.)

" 15 (1). — The regulations must cover all matters relating to the *road*, to the *vehicle*, to the *traffic* and to *administration*, in order that they can be applied without the slightest loss of time. It appears advisable to use the regulations agreed upon at the Paris Conference in 1921 (2) as a basis for the study of the question.

" The Reports contain sufficient data to facilitate the study of the question. "

THE CHAIRMAN. — There seems to be agreement for the adoption of conclusion N° 15 and for it being placed immediately after the conclusions which have just been approved. (Adopted.)

The conclusion N° 3 proposed by the General Reporter was then read :—

" 3 (3). -- Apart from the preceding conclusion, and in order to enable populous towns to adapt themselves to the present traffic and to prepare themselves for the *growth of traffic* and also for the *increase in speed* (in so far as this can be effected with safety) which all must admit to be a sign of progress, it would be advisable to lay down certain rules, which would comprise :—

" a) The most suitable form for the cross-section of new streets and the remodelling of old streets, enabling vehicles to make use of the whole width of the carriageway.

" b) Prohibition in very busy streets, of standing places next to foot-walks " *Car ranks* " being arranged whenever possible in the various quarters of the town.

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(1) 3rd of the adopted conclusions.

(2) *Conférence Internationale de la Circulation routière*, held in Paris (oct. 1921), at the Automobile-Club of France.

(3) 4th of the adopted conclusions.

" c) High-speed vehicles should travel at as great a distance as possible from the edges of foot-walks in order to diminish the risks of pedestrians.

" d) It must not be permitted to place columns, lamp-posts, overhead wire standards, hoardings, etc., in the part of the street intended for wheeled traffic, owing to the obstacles which they form for the latter.

" e) All applications for tramway lines in busy streets and squares should be rejected and metropolitan railways and motor omnibuses services should be encouraged.

" f) Animal-drawn vehicles should be excluded during certain hours in order to facilitate general traffic. "

MR. REES JEFFREYS. — The British delegation requests in agreement with the Delegation of the United States to present some amendments on conclusion N° 3. I propose consequently that the paragraphs be read and voted upon one by one.

THE CHAIRMAN. — The discussion is opened on the preamble and paragraph *a*. (These texts are adopted without discussion). Paragraph *b* is read.

MR. HART. — The British delegation proposes the following wording : " Whenever possible in convenient quarters of the Town ".

MR. MARTINEZ. — I accept this modification.

MR. GIRADO (Argentine). — I propose that vehicles be prohibited from standing along the pavements.

MR. CHAIX. — It seems to me impossible to accept this proposition, for if you forbid the vehicles to stop before shops, you are going to kill trade.

MR. MARTINEZ. — It is for the reason just indicated, that I have not formulated this prohibition.

MR. GIRADO. — I do not insist.

THE CHAIRMAN. — The paragraph *b* of Conclusion N° 3 (1) is approved with the addition proposed by the British delegation. (*Adopted.*)

THE CHAIRMAN. — The discussion is opened on paragraph *c*.

Mr. HART reads the amendment hereafter proposed by the delegates of Great-Britain and the United States :—

" c) Slow moving traffic should keep near to the footways to facilitate the passing of faster vehicles. The fast moving traffic should, where practicable, proceed some distance from the kerb so as to reduce the danger to pedestrians. "

The British proposition is drawn up with a view to facilitating fast moving traffic, for it compels the slow-moving vehicles to keep near to the pavements, with a view to protecting the pedestrians.

Mr. MARTINEZ. — I consider that the sense of the conclusion of my report is the same as that of the British conclusion ; but my conclusion is expressed under a more condensed form : indeed I say : " the prescription for fast-running vehicles to keep away as much as possible from the curb ", but I do not speak of slow-moving vehicles, for it is understood from my wording, that they can approach the curb, without it being necessary to make special mention of it.

Mr. D'Aoust. — The Belgian delegation propose another text, as follows :—

" c) The obligation to keep to the right (or to the left) does not imply that the fast-moving vehicles must keep close to the curb, this is in order to diminish the risks run by pedestrians. "

But I do not insist upon its adoption.

THE CHAIRMAN. — I put paragraph c to the vote with the wording proposed by the British delegation. (Adopted.)

Paragraph d is now open for discussion.

Mr. RERS JEFFREYS. — We suggest a slight alteration in the wording of (b). In England, much destruction is caused by vehicles going too close to the curb. We would like to have it read as follows : " Columns, lamp-posts, overhead wire standards, hoardings, must not be erected in the part of the streets intended for wheeled traffic, owing to the obstacles which they form for the latter. "

Mr. MARTINEZ. — I do not consider it possible to do away with all the obstacles on the pavement. We could confine ourselves to adding " if necessary ".

Mr. LE GAVRIAN. — The British proposition amounts to prohibiting the setting up of columns and obstacles, even on the pave-

ments, too near the street, where they might consequently form obstacles for traffic.

Mr. HART. — For wheeled traffic passing close to the pavements.

Mr. MARTINEZ. — I think it is useless to insist on this point, the amendment to my mind constitutes an excess of precaution, which is really unnecessary.

Mr. DE ALBACETE (Spain). — I am of opinion that this alteration ought not to be accepted, for in many instances the placing of columns and lamp-posts in the middle of the street far from being a danger, represents an additional facility for wheeled traffic and for pedestrians.

I consider that we cannot decide on a resolution so general as that recommended. What we ought to do, is to recommend that no obstacle be placed, no matter what it is, where the width of the road does not permit it. That is to my mind, the right solution; but to issue an absolute prohibition seems to me inopportune.

In our great cities, the placing of lamp-posts and shelters in the middle of the streets, has not only facilitated the traffic, but has been most convenient for the pedestrians.

Mr. MARTINEZ. — In the beginning of my remarks I explained why I have adopted such a categorical form of wording for my conclusions.

Mr. HANSEZ. — I believe we could keep to the wording of the General Reporter, by merely adding "except in very wide streets", where the presence of the obstacles might even present a certain utility, but in most cases, they ought to be suppressed.

Mr. MARTINEZ. — I accept very willingly the proposition which Mr. HANSEZ has just formulated.

Mr. BOURGEOIS (France). — Satisfaction could be given to the British and Belgian amendments by wording the conclusions as follows :—

"d) Columns, lamp-posts, overhead wire standards, hoardings, etc., likely to constitute an obstruction or a danger to traffic, should not be erected :—



" 1° In the part of the street intended for wheeled traffic, except, in case of very wide streets, where they can be placed with the necessary protection.

2° On pavements, too near the kerb. "

THE CHAIRMAN. — I put this wording to the vote. (Adopted.) Paragraph *e* is open for discussion.

Mr. D'Aoust. — I propose that the term " Metropolitan " be replaced by the words " underground or overhead railways. "

Mr. MARTINEZ. — I accept the amendment of Mr. D'Aoust.

THE CHAIRMAN. — I put paragraph *e* modified in the way just mentioned to the vote.

" *e*) All applications to lay tramway lines in busy streets and squares should be rejected and underground or overhead railway and motor omnibus services should be encouraged ".

(Adopted.)

Paragraph *f* of conclusion N° 3 (1) is open for discussion :—

" *f*) Animal-drawn vehicles should be excluded during certain hours in order to facilitate general traffic ".

Mr. GELINCK (Holland). — I think this prescription ought only to apply to the most important highways, and only in the great cities, for it is not indispensable for side-streets.

Mr. MARTINEZ. — Indeed, I was not thinking of the small towns when I drew up my conclusion.

Mr. MASSARD. — It could be added " there where it is strictly necessary ".

Mr. HART. — We find the prohibition concerning horse traffic too restrictive. Here is what could be the new wording : " The exclusion of slow-going vehicles on certain streets which at certain hours of the day, are very congested, in order to facilitate the traffic ".

Mr. RESINES (Spain). — The exclusion of animal drawn vehicles cannot be applied literally in the great capitals, for certain fast-moving animal drawn vehicles can almost move as fast as

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(1) 4th of the adopted conclusions.

motor vehicles. I think it would be better to modify the paragraph in the sense indicated by our British colleague Mr. HART.

Mr. MARTINEZ. — When wording this paragraph, I did not contemplate rapid horse traffic either.

Mr. LE GAVRIAN. — I propose to word the conclusion under the following form :—

" f) Slow moving vehicles should be excluded from certain streets during certain hours in order to facilitate general traffic in streets where this is absolutely necessary. "

THE CHAIRMAN. — I put paragraph thus worded to the vote. Adopted.

Let us pass to conclusion N° 4, of the General Report :—

" 4 (1). — As regards the arrangement of street junctions and of approach roads to populous towns the construction of foot bridges, traversers and crossing zones (with pavement different in colour from the general pavement of the street) and of subways (only where absolutely indispensable, because the public makes little use of them) can be recommended.

" It is advisable to increase the field of vision by doing away with fences, hedges, walls, etc., which restrict the range of sight "

Mr. LE GAVRIAN. — With respect to the first paragraph, I am quite in agreement with it, but I think it preferable to suppress the last parenthesis. Besides, to mark the different colours on the ground, other means than paving stones can be used; we could then alter the first parenthesis in this way " marked by a colour different from that of the adjacent street ". (*Approval.*)

THE CHAIRMAN. — The first paragraph will be then adopted with the slight alteration which has just been indicated.

Mr. MASSARD. — We propose the following wording for the second paragraph :—

" It would be well to increase the field of vision in as far as the zone is concerned, by establishing pans-coupés (bevelled-corners) and by suppressing, if necessary, dips and slopes, high walls, etc., which might obstruct the view from a distance "

Mr. MARTINEZ. — I accept this amendment willingly, for, in the main point, it does not differ from my report.

Mr. HART. — The British delegation has no objection to the amendment to the text.

Mr. D'Aoust. — The alteration proposed would be very difficult to apply : you will never succeed in increasing the field of vision by means of cants without adding a considerable amount of work in the construction of buildings.

Mr. HANSEZ. — I should like to have an explanation as to what is meant by " dips and slopes of the ground ". Having accepted the proposition of the General Reporter for the improvement of visibility, I should propose in addition the placing of mirrors in the streets, with the same object in view. It is said that the mirrors present many inconveniences, such as reflecting the solar rays; I do not believe that this is a serious objection, since the sun does not reflect freely into the streets. This device would be very efficacious for avoiding collisions and it would be well to have them at all the crossroads, whenever it is possible.

Mr. MARTINEZ. — In my General Report, I have tried to take into consideration the tendencies expressed in the different papers and to retain those which presented a general character and not isolated ideas. With respect to the mirrors, I consider that it is a question of an isolated request and moreover of a dangerous device.

Mr. CHAIX. — We all agree on this point that it is necessary to seek and realize the means of avoiding collisions at cross-roads. The words " cants " contain the indication of a solution but any other equivalent modification could be accepted. One could say for instance : " By increasing and facilitating the view at the cross-roads by all means at disposal : use of mirrors or other means ".

Mr. MASSARD. — Put : " in the places which are admittedly dangerous ".

Mr. HANSEZ. — I ask again what " dips and slopes of the ground " signify.

Mr. MARTINEZ. — They are the high and low points of the lay-out.

Mr. LE GAVRIAN. — The wording of the second paragraph could, it seems to me, be presented in the following form, which could take into account the last observations formulated :-

" It would be well to increase the field of vision at admittedly dangerous places by giving a better and wider view at cross roads, by doing away with bad gradients, high walls, etc..., which may obstruct the distant view. "

THE CHAIRMAN asks the Assembly if an agreement has been come to on this text. (*Approval.*)

THE CHAIRMAN. — The first new paragraph of the 4th (1) conclusion has been already adopted.

The whole of the 4th conclusion, is accepted, but the English and American delegates propose to add an additional paragraph which could follow the conclusion which we have just discussed. Mr. PYKE JOHNSON is going to say a few words to you about it.

Mr. PYKE JOHNSON (United States). — Mr. President, the American delegation had a conference with the British delegation, and desires to propose an addition covering subheadings in the report of the question on approaches to large towns, which does not seem to be included in the conclusions of the General Report. One of the largest problems in city planning is involved, and we feel that this question is one which should have the consideration of this body. No report can be acceptable to the American delegation which does not contain some reference to this question. In going through the report I find that the most acceptable form is as follows :— " In towns growing in size and population provision should be made for the building of new approach roads, parallel highways, and the widening of existing roads in advance of growing construction ".

Mr. HANSEZ. — I agree to this proposition.

Mr. LE GAVRIAN. — The French delegation agrees to it also. But, it should form a separate conclusion.

THE CHAIRMAN. — This proposition seems to meet with unanimous approval. (*Assent.*) It will be adopted under the form of an additional conclusion.

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(1) 5th of the adopted conclusions.

We shall pass to conclusion N° 5 of the General Report :—

“ 5 (1).—Traffic at street junctions can be regulated by giving preference to vehicles travelling along the main street, and in order to indicate the classes of streets in an unmistakable manner it would be advisable to adopt the system of coloured plates, the colours for which should be the subject of international agreement. ”

Mr. REES JEFFREYS. — I agree to the principle expressed in the resolution N° 5, but I am no partisan to a system of sign-plates, which risk the attention of the drivers being diverted when approaching cross-roads.

Mr. HANSEZ. — Nevertheless the main streets are distinguished by these sign-plates from the others. But even if we express our desire to see coloured sign-plates put up, we shall not obtain, in ten years, a complete system of signalisation of the main streets and roads. Therefore I think we ought, in conformity with the resolution adopted by the International Road Conference held in Paris in 1921, to give the right of way to the vehicle coming from the right of the road (or from the left according to the direction of traffic). This agreement should be brought into operation which is not yet the case in all countries; it is more important to have this principle observed than to attend to the classification of the principal streets, which, whatever is done, will never be known to everybody. A stranger arriving in a city may be doubtful of the category to which the street which he is crossing belongs, especially when two or several streets are of the same width, whilst if he is obliged to give way to the vehicle which comes from the right (or from the left), there will never be any ambiguity.

A measure of this kind would only have to be prescribed in order to be adopted by everybody, and many accidents would be avoided.

Mr. CHAIN. — I had the honour of presiding over one of the sections of the International Conference of Paris, and I agree with Mr. HANSEZ that the agreement concluded on this point is the best that could be come to. Since then, we have observed that drivers practically always give way, at cross-roads, to the vehicle coming from their right (or their left according to

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(1) 7th of the adopted conclusions.

the direction of traffic). It is the principle constantly applied in Paris, where the traffic is very dense, and we may congratulate ourselves on its adoption as much by the authorities as by private individuals. We have here a system which has proved its merit, and which, up to present, has given us every satisfaction.

The General Reporter has to-day made a different proposition; I do not doubt that it is very interesting, but it has the drawback of necessitating a preliminary trial, whilst the other system has proved its worth. The plates suggested for city streets have many objectional features but the principle of giving in all circumstances, priority to the vehicle which comes from the right (or from the left) offers us for the present every guarantee.

Mr. D'Aoust. — I share Mr. REES JEFFREYS' opinion. The priority on the main road should be adopted at the cross-roads outside the towns; instead of the word "street" one should use the word "artery". In all other cases, the driver would give way to the vehicle coming from the right (or from the left in countries where traffic keeps to the left).

Mr. CHAIX. — I think that the system proposed by Mr. D'Aoust would cause trouble in the movement of traffic, for, at any rate, as regards cross-roads, the consequence would only lead to considerable confusion, since the system adopted would be a mixed one.

Mr. RESINES. — I am of opinion, that in the countries where traffic keeps to the left, there is no need to give priority to vehicles which come from this side, but on the contrary the obligation to give priority to all vehicles which come from the right, should be adopted as a general rule, for the sake of simplicity.

We wish to simplify matters. Let us decide that this rule shall be applicable not only in towns, but at cross-roads outside towns.

Mr. CHAIX. — The application must depend on the rule of direction of traffic adopted in each country, because otherwise, drivers would run the risk of being obliged to have to change hands when signalling when passing cross-roads.

Mr. REES JEFFREYS. — I am afraid that the British delegation cannot accept the proposition made by Mr. RESINES that the vehicles coming from the right should always have the right of way. In England, everything coming from the left has the

right of way. With regard to the suggestion that traffic on the main street should have preference, judges in the Law-courts of England give consideration to the fact that a vehicle going along the main road has preference, and that any vehicle approaching from a side street has got to make sure that the main road is clear before that vehicle enters the main thoroughfare.

Mr. MASSARD. — I agree to accept the conclusion proposed by the General Reporter provided that the streets which are to have the preference are distinguished by some system of signs or signals; meanwhile, the right of way could be granted in every case, to the vehicle coming from the right or from the left, according to what direction of traffic is in force.

THE CHAIRMAN. — We are faced with two propositions : one submitted by the British delegation which accepts the conclusion such as it is, but deleting the words : " coloured plates "; the second, emanating from the French delegation, which also supports the conclusion of the General Reporter, but while waiting for its realization, would like to see the following rule applied : that the right of way would to be given to the vehicle coming from the right. There are the two propositions which have been made.

Mr. CHAIX. — Let us not speak of coloured plates nor of colours and let us simply say : " an international system of signalling ". I believe that this will satisfy our British friends. (*Assent.*)

Mr. HANSEZ. — I reserve my vote until the result of the discussion on the second part is known because if the first part were, adopted the result would be very regrettable.

THE CHAIRMAN. — Here is the second part of the French proposition : " Meanwhile, the Congress express the desire, to see the right of way reserved for vehicles coming from the right (or from the left according to the direction of traffic) ".

Mr. HANSEZ. — I should prefer the following wording which says the same thing, but with more precision :—

" Pending the adoption of such an international system, it would be possible to fall back, in certain cases, upon the system of giving priority to traffic coming from the right (or from the left, according to the direction of traffic adopted) ".

Mr. RESINES. — I believe it would be better to say " the right of way should be given to vehicles coming from the right when considering the driver ". The rule will then be perfectly clear.

Mr. LATORRE (Spain). — What is the meaning of the expression " right when considering the driver " ? Does this sentence refer to the position of the steering wheel ?

Mr. RESINES. — No, it is a question of any driver of a motor or animal-drawn vehicle; this driver must give way to a vehicle coming from his right.

THE CHAIRMAN. — We are going to vote : I read the amended text which is submitted to you :—

" 1° It is desirable that traffic at street junctions be regulated by giving preference to vehicles travelling along the main thoroughfare, and in order to indicate the classes of streets in an unmistakable manner it would be well to adopt a system of signals of international application. " (Adopted).

" 2° Pending the adoption of such an international system it would be possible to fall back, in certain cases, upon the system of giving priority to traffic coming from the right (or left, according to the rule of the road which may be in force). "

Mr. HART. — The British delegates and those of the United States are *a priori* opposed to the adoption of the second paragraph.

They agree nevertheless to the opinion expressed by the majority of the Assembly, considering the transitory and provisory character specified in the wording.

(The 2<sup>nd</sup> new paragraph is adopted).

THE CHAIRMAN. — We pass to conclusion N° 6 :—

" 6 (1). — In very busy streets it would be advisable to separate the traffic running in the two directions and where that is not possible, owing to the narrowness of the street, parallel streets not very far away can serve that purpose. The method of *marking out the centre line* (ligne d'axe) of streets appears to be very suitable for enforcing the separation, to the benefit of safety, the capacity for movement being thereby increased. "

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(1) 8<sup>th</sup> of the adopted conclusions.



The text of the amendment presented by the French delegation reads as follows :—

" The tracing of the axes on the roadway (axial lines) so as to have the effect of establishing a virtual separation to the profit of security as also to decrease in this way the importance of the traffic, is an arrangement which may be useful in a number of cases. "

Mr. MARTINEZ. — The French delegation would like to have a little more precision about the establishment of a separation; I am also of this opinion.

It says that it is a process, which " can render great services in many cases "; I had written : " We particularly recommend "; and, effectively, this process is to be highly recommended, since in the United States, notably in the state of Illinois, roads are constructed with " centre lines ", at a rate of 100 miles per year : in this country it would be an acquisition which has the value of approved system.

I believe that the wording of my conclusion must be preferred to the second form proposed, where it is limited to declaring that the process appears to be capable of rendering good service, which seems to diminish the importance of the subject.

Mr. REES JEFFREYS. — I should like to be very careful about establishing these centre lines; traffic is liable to be more dense in one direction than in another, according to the time of day.

Mr. CHAIX. — It is in this spirit that the French delegation has presented its amendment and has introduced notably the word " virtual ".

Mr. HART. — I consider the same result would be achieved by replacing the words " establish a virtual separation " by the words " guide the traffic ".

Mr. D'Aoust. — I should also like the words " centre " replaced by the words " medial lines ".

Mr. SOL (Spain). — I wish to draw attention to the value of the service which the lay-out of centre is called upon to render.

THE CHAIRMAN. — I put this conclusion to the vote with the following wording taking into consideration the various observation which have been made :—

" 6 (1). — In very busy streets it would be advisable to separate the traffic running in opposite directions and where that is not possible owing to the narrowness of the streets, parallel streets, not very far apart, should serve the same purpose. The marking of the centre line on the roadway so as to guide traffic for the promotion of safety and increased traffic capacity may be useful in a number of cases ". (Accepted.)

THE CHAIRMAN. — Let us pass to conclusion N° 7 :—

" 7 (2). — Rotary circulation is to be recommended in all squares and street junctions where the intensity of traffic renders it necessary ".

Mr. ILANSEZ. — I am supporter of the gyratory movement on all places having dense traffic, because this prescription would accustom the drivers to be more prudent; but I would like the proposition of the General Reporter to be completed by specifying that the places where the gyratory movement is obligatory should be indicated by means of signals.

Mr. CHAIX. — Are we not going to have an excessive profusion of signals ?

Mr. SOL. — It would be sufficient, in order to avoid confusion, for the gyratory movement be made obligatory on all places, whether the traffic be slight or intense, so as not to leave it to the driver to judge the importance of the traffic.

Mr. CAVESTANY (Spain). — It is impossible to accept the proposition of Mr. SOL. Let us take a concrete example : Catalogne Square at Barcelona, where all the tram traffic runs to; if the one way system were adopted, the number of vehicles taking the same direction would be so great that the entrance to the square would be completely blocked. This regulation cannot be admitted in an absolutely general manner. It is necessary to let it have a certain flexibility, to allow for places where the conditions are unusual.

Mr. PRADILLO (Spain). — I admit that the tramways block up the entrances to the squares, but we cannot any the less prescribe the gyratory movement for vehicles which do not run on rails.

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(1) 8th of the adopted conclusions.

(2) 9th of the adopted conclusions.

It is not only on Catalogne Square, but also at the Puerta del Sol at Madrid, that it would be impossible to adopt the gyratory movement of tramways; but it could be done for the other categories of vehicles.

Mr. HANSEZ. — I have merely asked for signals to indicate the gyratory movement there were it must be followed.

THE CHAIRMAN. — I read the new text :—

" Rotary circulation is to be recommended in all suitable squares and street junctions where the intensity of traffic renders it necessary. Notice of such a regulation being in force should be given by a standard international sign. "

(Adopted.)

THE CHAIRMAN. — I shall pass to conclusion N° 8 :—

" 8 (1). — Where the streets permit of it, it is advisable to divide their width into four parts. the fast traffic and the slow traffic each having two parts reserved for it, and to construct suitable refuges (not many) for pedestrians, which at the same time would serve to " canalize " the traffic ".

Mr. REES JEFFREYS. — Are you not afraid that the creation of refuges obliging the traffic to separate, as the Reporter proposes, will be a disadvantage by diminishing the space available for the traffic in the streets, especially in the great cities ?

Mr. GODSELL (Great-Britain). — It would be sufficient to divide the street into two parts without otherwise specifying the number of the lines of traffic.

Mr. MARTINEZ. — I agree.

THE CHAIRMAN. — Here is the amendment proposed :—

" Where possible streets should be divided by a limited number of refuges which, at the same time, would serve to " canalise " the traffic. "

(Adopted.)

THE CHAIRMAN. — I shall read the conclusions N<sup>os</sup> 9 and 10 :—

" 9 (1). — In streets in which, owing to their insufficient width, it is not possible for a dense traffic to pass in any other way, the

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(1) 10th of the adopted conclusions.

(2) 11th of the adopted conclusions

stopping of the flow of traffic at certain intervals by means of precise orders given by the police officers either directly or by mechanical means is to be recommended. "

" 10 (1). — Whenever possible properly prepared secondary streets should be arranged for the relief of the main streets. "

(Adopted without discussion.)

I shall read the conclusion N° 11 :—

" 11 (2). — Systems of electro-mechanical signalling should be studied, but these should only be adopted when practical experience justifies the assumption that they will be efficient. Each nation should inform the Permanent Commission of the Congress of the experiments carried out and of the results obtained. The arrangements submitted by the writers of some of the Reports are recommendable in principle. "

Mr. Paul WRETLIND (Sweden). — The very rapid development of motor traffic makes it desirable that the reports regarding experiments with signals should be sent in as promptly as possible. It is evident also that the proper filing and publishing of these reports is most important.

It will be appropriate to express a wish that such an international exchange of experiments should be extended to all fields of road technology. A great work in this direction has already been done in different countries. In the U. S. A., the National Research Council has a special Advisory Committee of Highways, the Director of which, Professor HART, attends this Congress. They are doing an admirable work. This year, the Royal Automobile Club of Sweden has founded a Highway Institute with the same purpose of collecting useful data and doing research work.

Thus, the international collection of data has already been prepared by national work and I strongly recommend the Executive Committee to give this question serious attention. (*Approval.*)

Mr. RYGNER (Denmark). — In most towns and especially in the old ones, the road system is so confused that it is practically impossible for a stranger to find his way even with a map.

This inconvenience could be avoided in the following manner.

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(1) 12th of the adopted conclusions.

(2) 13th of the adopted conclusions.

An indicator would be placed at each crossing where a main road leads off to a neighbouring town; it could conform with the model which I submit to the Congress.

The driver would be able, from a fair distance off, to perceive the globe and to approach it in order to read the inscriptions on its arms. The latter are of small dimensions, so that the driver would have to slow up a little to be able to read them; he would then speed up again until the next indicator without losing time at the turnings which are not be provided with indicators.

These indicators are made rather small to enable their being put up on the curb of the pavement and they are not inesthetic.

Mr. CHAIX. — You are suggesting a particular apparatus. I propose to the Section not to discuss it but to bring it to the notice of the Permanent Commission. (*Approval.*)

I propose to delete the last sentence of the proposed conclusion, for a similar reason.

THE CHAIRMAN. — I put to the vote the conclusion N° 11, thus modified. (*Adopted.*)

The conclusion N° 12 is read :—

" 12 (1). — Whenever it is possible to adopt any other method it is advisable to avoid level crossings of streets and roads with railways. "

Mr. TURELL (Spain). — I do not believe it is sufficient to indicate that the level crossings should be avoided. I think it should be said that they ought to be done away with entirely.

Mr. SOL. — That is precisely what I was going to say. It should be read : " every time it is possible from a technical point of view " so as to avert any reason for invoking an economic necessity and to render the justification of a level crossing henceforth impossible.

Mr. CAVESTANY. — I take the liberty of citing a few facts in support of Mr. SOL's request, for I consider we should go as far in this matter as is done at present in Barcelona.

Works are being carried in this city at a cost of 22 millions of pesetas for the purpose of doing away with the level crossings on one of the lines which cross Barcelona; it is also proposed to

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(1) 14th of the adopted conclusions.

devote a sum of 70 millions of pesetas for the suppression of the level-crossings on the two other lines which run into the centre of the city. It is for the Members of the Congress to see if there is occasion to invoke here a reason of an economical order, which appears to me entirely inadmissible; it is the technical side of the question which, I repeat, must alone decide.

Mr. MARTINEZ. — I am going to reply in a few words to my colleague Mr. SOL. On the Madrid road between San Fernando and Cadiz we have been able to realize that what was possible from a technical point of view was impossible from an economical point of view. It seems to me that it is not necessary to modify the conclusion and that we should maintain the wording "Everytime that another solution exists".

Mr. CAVESTANY. — I do not agree. It is essential to my mind, that the words "possible from a technical point of view" appear in the conclusion.

Mr. CHAIX. — I am of opinion that it is necessary to avoid the level-crossings on roads; but with a too rigid prohibition, we should risk being confronted with many difficulties in carrying out this scheme.

The suppression of all the level-crossings would come up against difficulties, almost insurmountable, from the financial point of view. In countries like Belgium and France, for instance, where the road system is extremely developed, the suppression of all the existing level crossings would cost thousands of millions. Let us ask then, that they be suppressed whenever it is possible, let us not ask any more.

Mr. CAVESTANY. — Under these conditions I should like the proposition of Mr. SOL to be adopted inside the towns and the proposition of the General Reporter to be applied outside.

Mr. TURELL. — Accepting the wording of the General Reporter, I should merely like to put the words "it is necessary" instead of "it is suitable".

Mr. MARTINEZ. — Agreed.

THE CHAIRMAN. — Here is the wording which is proposed for the 12th (1) conclusion in agreement with the General Reporter :—

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(1) 14th of the adopted conclusions.

" Whenever it is possible to adopt any other methods it is advisable to avoid railway level crossings on streets and roads. "

Mr. CAVESTANY. — I should like the expression : " Whenever it is possible to adopt any other method " to be suppressed " and that it should merely read : " The crossing of streets and roads on the level by the railway ought to be avoided ".

THE CHAIRMAN. — Is the amendment of Mr. CAVESTANY supported? Nobody wanting to speak, I put to the vote the text which I have just read. (This text is adopted).

The conclusion N° 13 is read :—

" 13 (1). — Special roads should be made for the exclusive service of sea wharves and central stations when the traffic in the contiguous streets is very great and when they cannot be used simultaneously for the whole of the general traffic. "

Mr. CHAIX. — The wording could be simplified by saying " when the traffic in the existing streets renders it necessary ". (Assent.)

THE CHAIRMAN. — Since there is no objection, the conclusion will be adopted in this form.

The conclusions N°s 14 and 15 (2) of the General Reporter have already been discussed at the same time as conclusion N° 1. We shall pass to the conclusion N° 16 of which the text is as follows :—

" 16. — The public must be educated by systems identical to those employed with success by the English and American " Safety First " and " Children's Essay Competition " organizations, their teachings being introduced in the primary schools and spread abroad by all the means provided by up-to-date propaganda.

" The utmost skill and the utmost control over their nerves must be demanded of drivers. It appears advisable that those authorized to handle a certain class or type of motor should not be allowed to drive motors of another type without having been previously examined as to their capacity. It frequently happens that when changes are made there is doubt and hesitation whilst the driver is making himself familiar with the new motor, and

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(1) 15th of the adopted conclusions.

(2) 2nd and 3rd of the adopted conclusions.

this causes serious danger to traffic because such drivers acquire their experience in the streets under the protection of the official licence they hold, which entitles them to drive a motor car of any kind ”.

Mr. CHAIX. — Certain colleagues point out to me that the second paragraph refers in reality to the issue of driving licenses. It is a new question, which is not in the order of to-day's business, and which is too important to be discussed without preparation. (*Assent.*)

Therefore I propose to-day to suppress the 2nd paragraph, which could be examined at another Congress, and only to keep the 1st paragraph. The latter is excellent, I should like however to replace the words “ systems identical to those used ” by the words “ methods similar to ”.

Mr. MARTINEZ. — I accept the propositions of Mr. CHAIX.

THE CHAIRMAN. — If there is no opposition, I shall put the modified conclusion N° 16 to the vote. Adopted.

Mr. MASSARD. — Now when we are about to conclude our labours, I propose that when we have returned home, we should ask our respective governments to take the necessary steps to prohibit all noise in the street which could be avoided. There are towns, where owing to the noise caused by the different vehicles, rest is impossible after three or four o'clock in the morning.

THE CHAIRMAN. — We have now come to the end of the work which has been entrusted to our second Section. I congratulate myself on the active and valuable collaboration each of the Members of the Congress has brought to bear for the completion of our task, and I thank them sincerely.

Mr. MAHIEU. — Gentlemen, we have come to the end of our deliberations. All we have left to do is to most heartily thank the members of this Assembly for the way in which they have contributed to the improvement of traffic and, for the conscientious way in which they have examined the questions which have been submitted to them.

I should like most particularly to thank on behalf of the Executive Committee the General Reporters who have been able to present us such remarkable summaries of the reports. Our



gratitude finally goes forth to our President, Mr. QUIJANO, whose great courtesy and perfect tact has been so appreciated during these debates and have enabled different tendencies to be conciliated. On behalf of the delegates who have taken part in these discussions, I have Mr. President the agreeable mission to express to you our most cordial and hearty thanks. (*Loud applause.*)

The meeting closed at 1,25 p. m.

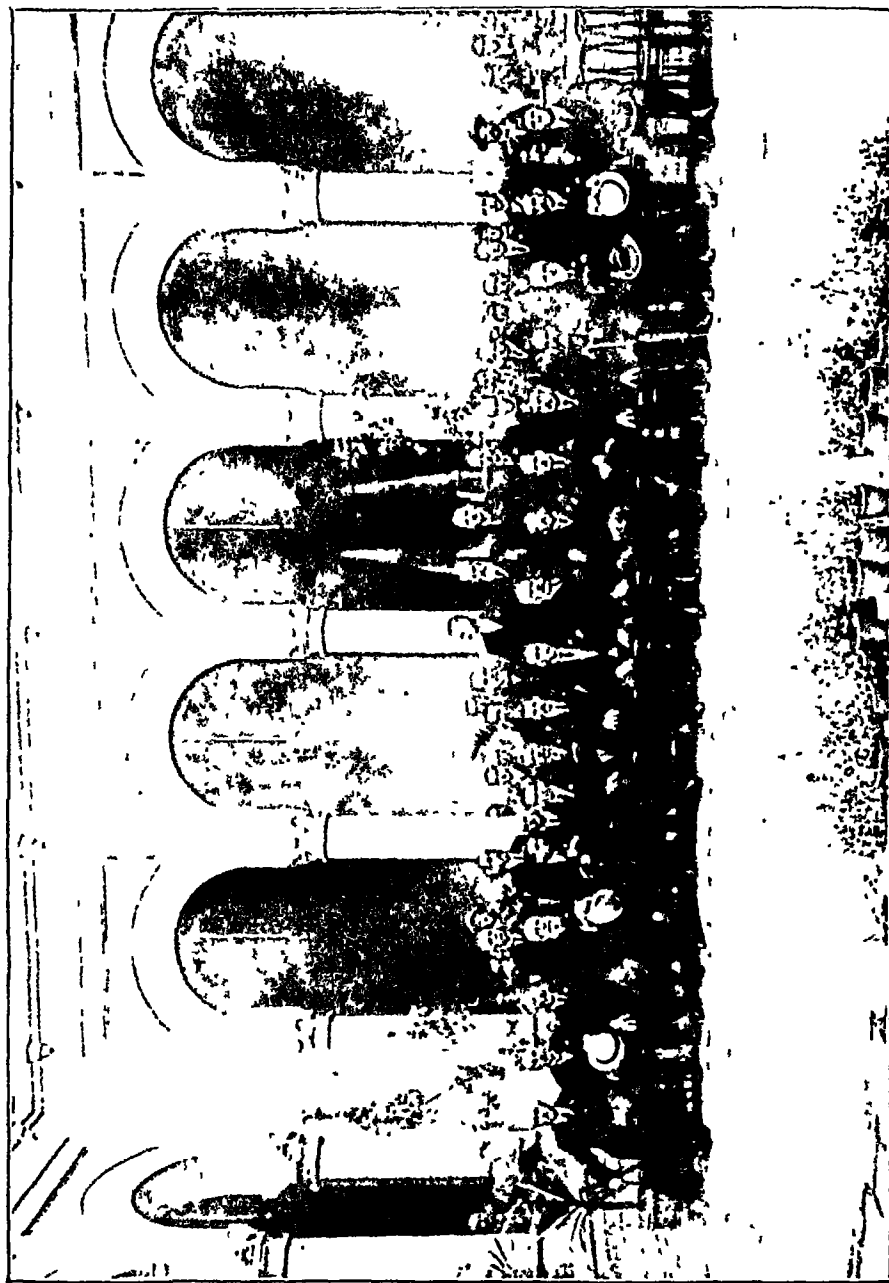
**MINUTES**

**OF THE**

**SECOND PLENARY MEETING**

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**CLOSING MEETING**



Closing meeting of the Congress

# SECOND PLENARY MEETING

(CLOSING MEETING)

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Saturday May 12, 1923

Mr. ALFONSO SENRA,

*Sous-Secrétaire du Ministère de Fomento, Presiding.*

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The meeting opened at 3,35 p. m.

THE PRESIDENT (in Spanish). — Mr. MAHIEU, President of the Permanent International Commission of Road Congresses, will speak.

Mr. MAHIEU (in French). — We are going to read the conclusions on the six Questions which have been discussed by the Sections of Congress and submit them successively to your approval. The text was published in the last number of the Congress Journal which you have before you.

Mr. IBARRA reads in Spanish the conclusions relative to the 1st Question.

Messrs. BOURGEOIS (France) and E. H. HART (Great-Britain) read the conclusions respectively in French and English.

THE PRESIDENT. — Are these conclusions approved ?

Mr. MUILEN (Belgium) (in French). — I should like to say a few words on one point. As reporter on this Question, I should like to point out that the second conclusion contains the statement that it is difficult to repair concrete roads when badly

damaged. I think that the word " difficult " implies rather more than was meant by the authors of the text. What they meant was not that the execution of repairs offers particular difficulties, but that the repairs are laborious. I suggest therefore that the word " *difficult* " be replaced by the word " *laborious* ".

Mr. MAHIEU (in French). -- The word " *laborious* " is not perhaps the best. What is meant is that the repairs necessitate a considerable amount of work.

Mr. GEVAERT (Belgium). -- Concerning conclusion n° 9, I find that the text which is submitted to us contains no allusion to the communication made at the meeting of the 1st Section by Mr. BRILS, relating to the interest there may be in placing between a concrete dressing and the foundation, a layer of clay for instance allowing these two layers to slide one in relation to the other and thus probably preventing cracks.

Mr. MAHIEU. -- There may have been an omission in the drafting and if so it will be rectified.

THE PRESIDENT. -- Has anybody anything to add on the 1st Question? The conclusions are therefore adopted, account being taken of the observations which have just been made.

Let us pass to the conclusions on the 2nd Question.

The conclusions on the 2nd Question are then read in three languages: they are approved without observation.

Mr. REES JEFFREYS (Great-Britain) (in English). -- Mr. President, before the Secretaries read the resolutions proposed by the two Sections of Congress on the other Questions, I should like to ask if there is any one who is not willing to have the reading suppressed. We have all before our eyes the text of these conclusions in French, Spanish and English. It would be sufficient then to merely read the numbers of the conclusions, so as to permit anyone who has any objections to make to present them. (*Applause.*)

Mr. MAHIEU (in French). -- Gentlemen, with respect to the Executive Committee of the Permanent Association, I raise no objection to the rather expeditious method suggested by Mr. REES JEFFREYS: but I must say that it should be understood that these conclusions, in default of observations from you, will be if

necessary adjusted as regards the details by the Executive Committee so as to cause no surprise to anybody, and so that they may be considered as definite conclusions. With this reservation, I can only propose to the Under-Secretary of State Mr. DR. FOMENTO to adopt the method proposed by Mr. JEFFREYS.

THE PRESIDENT. — Is there any objection? Since nobody objects, we will adopt this method.

Mr. MAHIEU (in French). — The two first Questions having been adopted, we are going to put to the vote the conclusions relating to the third Question. Those who agree to adopt these conclusions are asked to raise their hands.

There is no opposition; the conclusions are adopted.

The usual question having been asked, the Assembly approves the conclusions of the third Question.

The conclusions relating to Questions 4°, 5°, 6°, are put to the same vote by the Assembly and adopted.

Mr. MAHIEU. — Consequently, the conclusions on the six Questions are approved, with the reservation that I indicated concerning the details of the drafting.

THE PRESIDENT (in Spanish). — The members of the Committee ask me to submit to the approval of the Assembly the text of a telegraphic message which they propose to address to H. M. King ALPHONSO XIII, Mr. VALENCIANO is going to read it to us.

Mr. VALENCIANO reads the following message (in Spanish) :—  
To the " Mayordomo Mayor de Palacio, Madrid. "

" The IVth International Road Congress, on concluding its work, respectfully begs H. M. King ALPHONSO XIII to deign to receive the expression of its sincere gratitude for the support which he has given to it and which has ensured its success. It takes advantage of this opportunity to express to him its gratitude for the enthusiastic welcome which the Spanish Nation and the people of Seville have extended the Congressists who will never forget it ".

This text read in three languages is welcomed by hearty applause.

THE PRESIDENT. — The President of the International Association of Road Congresses will speak.

Mr. MAHIEU, *President of the Permanent International Association of Road Congresses* (in French) :—

Mr. Under-Secretary of State,  
Ladies and Gentlemen,

The fourth Congress is going to close in a few moments and the President of the Permanent International Association of Road Congresses wishes to tell you of its happy results and to congratulate most sincerely its organizers in your name.

The task was heavy : they had first of all to get premises ready to receive seven or eight hundred Congressists, it was not easy to do, and it was necessary, to be successful, to find in the population of Seville that noble virtue of hospitality which honours so much this great country Spain, and which the world appreciates at its just value.

Thanks to the courtesy of all, we have been living for eight days in a perpetual enchantment and yesterday even the sun willed to show itself mild for our colleagues and friends of quasi-boreal regions.

Nothing was wanting, neither sumptuous fetes, cordial receptions, nor the highest patronage; and I am sure I am your interpreter in addressing the homage of our thanks to the illustrious members of the Royal Family who have kindly deigned by attending our meetings and our entertainments to testify the great interest they take in our IVth Congress.

Thanks to them, to the assistance of the Municipality of Seville, the Exhibition Committee and all the population, we have had entire success, and our stay will be reckoned as one the most agreeable.

May I be permitted to mention especially our President Mr. VALENCIANO and our General Secretary Mr. PROTA, who have not ceased to guide us and direct us, and whom we have always found, despite their hard labour, smiling and anxious to help us and be attentive to us.

But, Ladies and Gentlemen, the Congress of Seville has not been only the occasion for fêtes and rejoicings, it has, I think I am entitled to say so, made a considerable advance in Road science.

Since the 1st Congress we have tried at every session to fix the methods of construction and maintenance capable of giving to the streets a resistance sufficient to permit them to resist the destructive effects of automobile traffic.

Prudently, step by step, the first three Congresses studied the problem under all its aspect; but the IVth Congress went further, it was able to prove that from now on the new methods had become so practicable that their application could be recommended.

It has also, as regards general traffic, laid down rules so as to, I shall not say suppress, but to diminish the number of accidents, both for the drivers of vehicles and for the passengers.

Let everyone follow the prescriptions of a general order edicted by our conclusions and we shall see open up the golden age of road traffic : no more disputes, no more accidents. Perhaps you find that I go a little too far in my affirmations, I do not deny it, but I prefer to be an optimist and to anticipate the salutary effects of these prescriptions.

Yes, Ladies and Gentlemen, we have made progress in road science and that, because we have all been able to discuss our knowledge and our experience in common, and also because we have all been willing sometimes to set aside our preferences and sacrifice aspirations or private habits for the good of all. We find there a work worthy of an Assembly which has the Representatives of forty-five Nations as members, and allow me to add, one of the forces which will enable us to ask our respective Governments to adopt the conclusions of the IVth Congress, observing at the same time that none of us has abandoned his independence and that all national requirements have been taken into consideration.

We shall not stop in the way opened up by the deliberations of Seville, for there remains very much to be done, as much for the construction and upkeep of the road, the future necessary for transports becoming more and more numerous and more and more rapid as for directing and ordering the movement of these vehicles at different rates of speed driven by men of all categories.

Let us only remember to-day's success as an encouragement for the future and let us decide from now on that the fifth Congress shall not be less brilliant nor less fruitful than the fourth.

Spain and its noble King H. M. ALFONSO XIIIth, have known how to show us the example and we shall know how to be worthy of his high patronage and the success of Seville. (*Loud applause.*)

Ladies and Gentlemen, allow me to add a few words in the name of France which I represent at the IVth Congress, with numerous compatriots. Neighbours of Spain, we know its great



qualities of intelligence, work and energy. We know how you co-operate with us every day, and we only ask one thing, that is, to strengthen the ties that unite us.

Weeks like that in Seville cannot but make us appreciate your friendship still more, and I wish to thank you in my name and in the name of my fellow-citizens, for all the marks of cordial sympathy which you have bestowed upon us.

I shall be able to say on the other side of the Pyrenees all the good which we think of you and of your great Country.

Ladies and Gentlemen, Spain and its noble King have known, during the terrible trials we have gone through during the Great War, how to make themselves loved and respected by the French Nation; now the evil days have passed, but these sentiments remain still more ardent and they will never be extinguished. (*Applause.*)

Mr. CACFRIEZ, *Belgian delegate* (in French) :—

Mr. Under-Secretary,  
Ladies and Gentlemen,

After the speech of Mr. MAHIEU, I it would be presumption on my part to make a speech in order to express to you, so much less ably than he, the sentiments which animate me. I am then certain of anticipating your wishes, by being as brief as possible.

It would be impossible for me, I repeat, to rival with the President in the ardent speech which he has given in the homage he has rendered to HIS MAJESTY the King, to the Spanish Government, to these Gentlemen of the Municipality of Seville, as well as the organizers of the Congress.

I take however the liberty of pointing out particularly the mastership with which the Sectional Presidents, Messrs. SPITERNI and QUIJANO have accomplished their difficult task.

The praise of Spanish courtesy it is evidently not necessary to repeat; but these gentlemen have really surpassed themselves from this point of view; I believe then we shall all agree to heartily congratulate them for the great skill with which they have directed our work, as well as for the exquisite delicacy which they used while carrying out their duties.

The best wish that I can express is, that the next Congress may see at its head men who possess these qualities in an equally high degree and with this wish I shall conclude. (*Applause.*)

Mr. DA SILVA FREIRE, *Delegate of Brazil* (in French) :—

Mr. Under-Secretary,  
Ladies and Gentlemen,

I am very happy that there is some one here to speak in the name of my Country; I am, moreover, greatly honoured to have been designed for this flattering mission; only I deplore, as much for you as for Brazil, that another more qualified than I, has not been intrusted with this mission. What is to be done? We are so far away...

You must not believe however, that no interest is being taken in road problems in our country. The State of Sao Paulo, with a road system of two thousand kilometres, created in less than four years, under the impulsion of its present Governor, Mr. HASINGTON LUIS, shows you on the contrary that great interest is being taken. You will find another proof of this fact in the mission that the city of Sao Paulo, capital of this State, has entrusted to me, to come here to gather the fruit of your teaching. We know that we have need of roads, many roads, many good roads especially; we are aware that the Permanent International Association of Road Congresses can, better than anybody else, help us to fulfil this task of civilization and progress.

Therefore I am sure of being the interpreter of the unanimous sentiment of my compatriots when to-day I thank our Association for all it has done for us and express to it the confidence which I have in its future endeavours, finally expressing the hearty wish that the future Congresses will not be less important than the present one, neither from the point of view of work accomplished nor, what will be a little more difficult, from the point of view of the charm of the place selected for the Congress, of the charm of this never-to-be-forgotten week which the noble sons of Spain have made so pleasant for us that it has passed like lightning, in the ravishing capital of their Andalusia. (*Applause.*)

Mr. MADSEN, *Delegate of Denmark* (in French) :—

Mr. President,  
Ladies and Gentlemen,

I shall only say a few words, but I do not wish to go away from this Congress without telling you in the name of my com-

patriots how sincerely we thank you for the instruction we have received. We shall try to take advantage of it for the greater benefit of our country. We are glad to be able to thank most sincerely the Government and the Spanish Nation, the city of Seville and the organizing committees for such a hearty welcome. You may sure that the remembrance of our stay in this delicious country will remain engraved in our hearts. (*Applause.*)

Mr. FRANCISCO CARRERAS Y CANDI, *Delegate of the Dominican Republic* (in Spanish) :

In the name of the Spanish-Americans, which I have the unmerited honour of representing to-day, I join my felicitations to those which have just been addressed to the organizers of the IVth International Road Congress.

But I should betray the confidence my colleagues have placed in me, if I did not add to these felicitations something more, something which lies in the depths of each of our hearts.

It is first of all our fraternal salute to the city of Seville, represented here in such a distinguished way by her Alcade, and oldest sister of all American cities, she is entitled for many reasons, to the consideration of all Spanish-American nations. The principal is that she has in guard a great part of the remains of the great explorer Cristopher Columbus which lie in a mausoleum of the Dominican Cathedral, primatial Church of America. Then she has in her keeping all the treasure of Spanish-American history, kept in her interesting " Archivo de Judios ".

But that is not all. The Spanish-American Nations wish through me, to present their most respectful homage to H. M. King ALPHONSO XIII, who has known so well how to guide the Spanish nation in the difficult period which the whole world has gone through. This monarch, if he governs our old mother-country, reigns at the same time in the hearts of the Spanish-Americans.

Mr. W. W. CROSBY (*United-States*) (in English) :—

It is extremely difficult if not impossible for me to express briefly but properly, for the American visitors, their pleasure and enjoyment with the beauties of Spain and the generous hospitality of our Spanish Hosts. Therefore I can only say that, after making a voyage of more than three months and nearly around the world to reach here, I feel repaid fully for the effort.

Unfortunately, the United-States is not yet officially a member of this Association, but I feel confident she will be, in the very near future. As soon as that is accomplished formally, I am positive that an invitation will be extended for an American Congress, and I feel that as we are all extremely anxious that this Congress should come to America, it will be arranged promptly. At that time, I sincerely hope that you will all visit us and will carry away from such a Congress as much pleasure and gratification as we carry home with us. (*Applause.*)

MR. REES JEFFREYS, *Delegate of Great-Britain* (in English) :-

Mr. President,  
Ladies and Gentlemen,

On behalf of the representatives here of Great-Britain, we desire to express our great gratification that these Congresses have now been resumed. It is at any rate a sign that men of different nations are meeting together once more to pool their efforts to improve the roads, and the transport of mankind, and experience shows that improved roads and improved transport contributes more to the peace, prosperity, and health and mankind than any other factor. We are glad and very glad indeed to meet our Spanish friends and we hope that the acquaintances that we have made in this Congress will be cemented and improved at the future Congress. We want particularly to thank the Local Committee of Seville for all that they have done to entertain us and to make pleasant and agreeable our stay in this very old and very important city which has contributed so much to the world's culture, birthplace of two of the greatest painters who have ever lived, and we thank you also Mr. President, and we wish you and your Department every success. Above all, we wish long life and happiness to the King and Queen of Spain. (*Applause.*)

MR. GELINCK, *Delegate of Holland* (in French) :—

Mr. President,  
Ladies and Gentlemen,

As the close of this Congress I feel I must express here my hearty thanks for the unforgettable welcome which the Royal Spanish Government and all the authorities have kindly reserved for us during this week. Between the French frontier and the end of our journey, we have been able to admire the beauties of

this country and its capital. But our admiration has increased on our arrival in the beautiful province of Andalusia and on our entrance in the superb city of Seville.

Ladies and Gentlemen, we all, Congressists of Holland, will retain profound and lasting memories of our stay at Seville; I ask you then to allow me to express all our gratitude by crying : Long live Spain. (*Applause.*)

Mr. ISACCO, *Delegate of Italy* (in French) :—

Mr. President,  
Ladies and Gentlemen,

The homage and thanks which I expressed at the beginning of the Congress become, at the close of our meeting, more intimate and heartier before the amiable and cordial welcome of the Spanish Government and Sevillian authorities. It is friendship which presided at our labours. We have been the object of a continual and delicate attention in this charming city. It is not only the representatives of noble Spain, it is the whole population of Seville and its neighbourhood which has given us so many proofs of affectionate solicitude; thanks to which we Italians, have not had the impression of being received as esteemed strangers, but rather as friends, as brothers.

A speech is not necessary to express this sentiment, a word is sufficient, thanks, thanks to Seville, thanks to its first citizen. Thanks, glory and prosperity to Spain. (*Applause.*)

Gentlemen, I have a letter from the High-Commissioner of the Italian Government for the municipality of Rome, who confides to me the honour of representing our capital in this Congress. This letter unfortunately came to late, not too late however to prevent me from transmitting to the Congressists, at Seville, in Spain, the salutation of the nation your friend and sister.

Moreover the Italian Government has entrusted me with the agreeable mission to propose that the next Congress take place in Italy.

I have received from the Minister of Public Works, a telegram which transmits to me this invitation, made in the name of President MUSSOLINI. It is not a question of a purely personal wish, it is a question of a government desire, which is the desire of the whole Italian Nation. We hope that this desire will be granted and we propose not only to procure for you the spectacle of our

natural and artistic beauties, but also to show you many things very interesting for the technicians and the administrative authorities of roads.

In any case, we can tell you that you will be welcomed in our country, as amicably and fraternally as we have been here, for we desire, and the Italians desire, that the road should not only make significant material progress, but that it should keep on increasing from a moral point of view; in a word we wish that it may become the instrument of peace, love and fraternity among the peoples. (*Prolonged applause.*)

Mr. MAHIEU, *President of the International Association of Road Congresses* (in French) :—

Ladies and Gentlemen,

In my turn I shall declare, that I believe I am the interpreter of all present, when I tell the Head of the Italian delegation how flattered we are by the official invitation which his Government has kindly extended to us for the Vth Congress. This question is in the province of the International Commission to which we shall submit it at its next meeting. Meanwhile I thank our colleague in your name, for the agreeable transmission he has just made us. (*Applause.*)

Mr. GAKU MASUMOTO, *Delegate of Japan* (in Japanese, then in Spanish) :—

Your Excellency,  
Ladies and Gentlemen,

In the name of the Imperial Japanese Government I express our gratitude and our respect to the President and all those for whom the IVth Road Congress which we have the honour of attending was the occasion of such a great success.

Our gratitude must also be extended to the Spanish Government and the authorities of Seville, to Messrs. VALENCIANO and PROTA, for all the kindness they have bestowed upon us. Never shall we forget the charming impressions which we shall take away with us of our stay in the beautiful Sevillian capital, the most enchanting spot on earth.

Also when we shall have returned to our country, we shall have the honour of communicating those agreeable impressions to our Government and our compatriots.

We wish the most brilliant future for the work of this Congress; and the health of all those assembled in this hall. (*Applause.*)

Dr. GUGLIELMINETTI, *Delegate of Monaco* (in French) :—

Your Excellency,

I made at the opening of this Congress a great effort through good will towards Spain, in order to tell you, in the beautiful language of Cervantes, how much we were charmed with your kind welcome.

To-day, after the few days so happily passed in your midst, my dear friends of Spain, like a dream, alas too, short to-day we tell you with great pleasure that the reality has exceeded all our hopes.

Many thanks to the Organizing Committee, to its President Mr. VALENCIANO, the sympathetic Sub-Director of Public Works, and to Mr. PROTA, General Secretary, who is amiability itself.

What we especially admire among your numerous manifestations of art, tauromachic sport, among your sumptuous palaces, your gardens adorned with the most beautiful roses of the world, what we admire especially, is the grace, the beauty, the charm of the Andalusian woman, queen of flowers. We shall return to Seville, my dear friends, like the swallows of Bequer, but that time to remain longer amongst you.

Long live Spain, long live Seville. I should like before sitting down, to inform you of a suggestion which the Count Colombi, Royal Commissioner of the Spanish American Exhibition, has just communicated to me.

"Seville constitutes an interesting touring centre, it is desirable considering the extraordinary importance of the roads which connect Seville to the great ports which assure the transatlantic service, port of (Algesiras) and those which lead to Cadiz, Huelva and Malaga, as well as to the great capitals Madrid and Lisbon, that these roads be kept up according to the directions advocated by the Roads Congress.

The circuit Seville-Grenada-Cordova can be considered as unique in the world and deserves that the Congress draws the attention of the Spanish Government to the international importance of the cities named and their highways. (*Applause.*)

MR. ALBERTO DE OLIVEIRA, *Delegate of Portugal* (in French) :-

Mr. President,  
Ladies and Gentlemen,

In the name of the Portugese Government I associate myself very respectfully with the homage addressed to His Majesty the King of Spain ALPHONSO XIII who presides in such an eminent manner over the destinies of the noble Spanish Nation.

I have also the honour of fulfilling another task as Government representative of my country and as interpreter of my compatriots here present : it is to heartily thank all those who have helped to make our few days work and pleasure, passed in the historic city of Seville, unforgettable. We leave enchanted with its marvels, the fame of which is known all over the world and we shall always remember the splendid and friendly welcome which we have received.

I shall not dwell on the importance of this Congress, other voices more authorized than mine have already described the brilliant result obtained.

As for us, we Portugese, we are keenly interested in all the work of the Congress. On our return to our country, instructed by your wise counsels and by the knowledge gained, we shall esteem ourselves happy to be able to contribute according to the most appropriate methods to the improvement of our road system. We shall supply it with what is now wanting in order to satisfy the requirements of modern traffic which becomes every day more considerable and more rapid.

Allow me to take advantage of this occasion to express my profound gratitude and my sincere admiration to the Spanish civil Engineers whom I salute respectfully in the name of the Portuguese Civil Engineers who have entrusted to me the honour of representing them at this Assembly.

To you, Mr. President, and to all the Members of Congress, I address the most hearty and most affectionate salutations of the Portugese delegates who surround me. (*Applause.*)

MR. KUHN BIRAJ BISDARA, *Delegate of Siam* (in French) :-

In the name of His Majesty the King of Siam, my august sovereign, in the name of the Siamese Government, I have the honor to thank His Majesty the King of Spain, the Spanish Government and the Municipality of Seville, for the kind



welcome they have given us, on the occasion of the IVth International Roads Congress, of which the success is so evident to all of us.

I take the liberty of expressing my ardent desire for the prosperity of H. M. King ALFONSO XIII, the Royal Family, the Spanish Government, the Municipality of Seville, our President of Congress, as well as the Spanish people. (*Applause.*)

Mr. AXEL VALSINGR, *Delegate of the Royal Swedish Government* (in French) :- -

Mr. President,  
Ladies and Gentlemen,

The IVth International Roads Congress is coming to an end, after having solved the various questions which were submitted to it.

As Delegate of Sweden, I have the great pleasure and pleasant duty of speaking in the name of the Swedish Members of this Assembly.

We are happy that we have been able to take part in this Congress, which has permitted us to visit your beautiful country of Spain.

We had come to the Congress intending to learn and I wish to tell you that we have learnt much in the science of roads; we shall thus be able to contribute to the improvement of our road system and the arrangement of our roads in view of adapting them to the new kinds of locomotion.

At the moment when, come to the end of our work, we are going to see interrupted a collaboration during which we have exchanged so many ideas, learnt so many things, made friendships, we feel the sadness of separation; but we hope to see one another again in the near future.

In the name of all my compatriots who surround me, I beg to express first of all our profound gratitude to Sr. Don Antonio VALENCIANO, General President, and to Sr. Don Luis PROTA, General Secretary, for the distinction with which they have directed the debates of the IVth Congress.

Finally we express our most hearty thanks to the Local Organizing Committee, to the Spanish personalities and corporations who have offered us such a kind welcome and such a splendid hospitality, during the IVth Congress, during a few unforgettable days passed in this noble and charming country of Spain,

of which we shall keep for ever the most profound and affectionate remembrances. Once again thank you: I shall conclude by crying: " Long live Spain! "

Mr. STEINER, *Delegate of Switzerland* (in French) :—

I have the honour to address on behalf of the Swiss Delegation our hearty thanks to the Spanish Government and more especially to the Authorities of the city of Seville, whose hearty welcome has deeply moved us. Therefore we have not to regret having undertaken such a long voyage; if we knew in advance all the benefit we should derive from the Congress, we also feel attracted by the charm of your beautiful country and we wish to make better acquaintance with the Spanish people, with whom Switzerland has always had most friendly relations.

We can assure you that we shall have an imperishable souvenir of our stay in this beautiful capital of Andalusia and it is most heartily that we cry: " Long live Spain ". (*Applause.*)

Mr. HERMANN, *Delegate of Czecho-Slovakia* (in French) :—

Mr. President,  
Ladies and Gentlemen,

I take the liberty of speaking in order to heartily congratulate you the Congress Committee, on behalf of the Delegation of Czecho-Slovakia, for the results brilliantly obtained, thanks to the debates which it has so well directed.

We are happy to have been able to participate in the discussions which have taken place in this eminent Assembly. We are sure the directives established will lead to a solution of a problem which is in close relation with the union of states and the Nations for the greater benefit of civilization: that of communication by road.

Therefore, you have gained our gratitude for all we have heard in the domain of technics and for all what we have seen in this beautiful country of the sun.

I repeat then our hearty congratulations to the Congress Committee. On behalf the Delegation Czecho-Slovakia, I present most sincere thanks to the Royal Government of Spain, to the President, the Permanent Committee and to all the Members of Congress as well as the sympathetic population of this marvellous city of Seville for the aimable welcome of which we have been the object.

Count DE HALCON, *Alcalde of Seville* (in Spanish) :—

Ladies and Gentlemen,

I rise merely to thank the speakers who have preceded me for their kind words and compliments which they have bestowed on us at Seville : I appreciate them, believe me, as they deserve.

Gentlemen on the first day of this Congress I told you that the people of Seville would to their utmost to render your visit to this country agreeable. If we have succeeded, our success will be our best reward. If we have failed our desire to please you will at least have been evident to you.

I congratulate you, Gentlemen, on the brilliant results of this Road Congress. I also congratulate Messrs. VALENCIANO and PROTA; on taking leave of you, I should like in order that you may take back with you pleasant memories of Seville, to express my wishes for your happiness and to beg you to transmit to your respective Governments the most affectionate respects of the people of Seville. (*Loud and repeated applause.*)

Mr. SENRA, *Under-Secretary of the Ministry of Fomento* (in Spanish) :—

Ladies, Mr. President,  
Gentlemen,

We have now come to the formal meeting which closes the cycle of the great and admirable work to which the most distinguished representatives of the Engineer's art in the whole world have devoted themselves. It is not by means of an iron key, rough and worn, of which which my modest personality is the symbol; it is by means of a golden key, in the person of the Head of the Spanish Government, or indeed of the Ministry of Fomento, my chief and my friend, that such a session ought to have been closed. Both unfortunately are retained by imperious obligations, that is why, Gentlemen, you see me here to-day among you and I tell you, you lose enormously by the change. I must tell you however that I have always considered myself as being a little one of yourselves. That from my youth, I have felt myself attracted by your works, by all that concerns the science of the Engineer. Indeed I have constantly remained attached to the policy followed by the present Minister of Fomento, Mr. GASSER, who, on every occasion, for more than a

quarter of a century has only had one thought, to develop the public works and to bring them to such a degree of perfection that they will be second to none.

Owing to the passion that I have always displayed in the accomplishment of the work, I feel to-day a real satisfaction to find myself among you; but, a pure outsider among the technicians that I see around me, I can only speak to you of my art, of the art presented before you by him who has devoted his whole life — although he has not been able to pass the apprenticeship stage — to the most difficult art of all that of Governing. It would be in vain, that the world over, great intellects devoted themselves to scientific speculations, if one could not rely upon men guided by a resolute vocation who abandon themselves heart and soul to this ungrateful calling — the exercise of it indeed seems very easy to everyone and the critics are always to be found — and your studies, your writings, your work in the Congresses would be in vain.

In the first place, Gentlemen, I should like to express most sincerely my deep, sincere, and ardent gratitude to the pick of the Engineers of the whole world united in this Assembly; may they receive all my thanks, for magnificent as may have been the welcome given to such personalities, as much by Spain as by the Municipality of Seville, what they have brought us in return, is of inestimable value. I shall transmit then on behalf of His Majesty's Government, the expression of my fervent gratitude, for their cordial statements deeply move the Spanish hearts.

I am happy to inform you, Gentlemen, that the work which has brought you together at Seville was the object of constant attention by His Majesty the King who has kept in touch with the Government in order to follow your deliberations; this is the high mission with which I have been entrusted: the problem which was the object of your discussions and which aims at bringing up the "road", this line of communication called in Spain "carretera", to the level of modern requirements, is of such importance that your conclusions, when they reach the Spanish Government, will receive a most favourable welcome, and this Government will act so that its Delegates or representatives may declare during the Vth International Congress: "The instruction we have received from the IVth Congress, held at Seville, has been taken advantage of by the Government and the proof of it is to be found in such and such works carried out according to this instruction". (*Applause.*)

And now, Gentlemen, not wishing to try your patience any longer and not being able from a technical point of view to mention more extended developments nor to tell you anything more than the declaration that I have just made you on the intention of the Government to take the fullest advantage of your deliberations, permit me after thanking as I have done, its foreign representatives for their speeches, to particularly address the Alcalde of Seville.

The Government knew, Mr. Alcalde, that in your hands, and in the hands of the Municipality of Seville, this beautiful city, the treasure which Europe, America and the whole world envy, was in a position that none could equal to receive the Congress, we know Mr. Alcalde that, authority privileged, envied and enviable, you are Alcalde of the most gracious, the most beautiful city of the world, a city object of admiration for its own children as for the foreigners, of a city which is the pride of Andalusia, the enchantment of Spain, of a city where everything is smiling, where even rose-trees have no thorns, of a city where one can only go through hat in hand, the eyes hypnotized by admiration, the soul agitated by the violence of the most pure emotions of art. As for me, Mr. Alcalde, I give you, on behalf of the Government, its heartiest thanks; I congratulate all those who have received your hospitality, and my felicitations extend also to Seville, to its Municipality and to its distinguished Alcalde. (*Applause.*)

I also thank warmly the Spanish-American Exhibition Committee who has offered such splendid and luxurious premises to the Members of this illustrious Congress : thanks also to all these Gentlemen of the Organizing Committee, to my dear friend Mr. VALENCLANO, President of the Executive Committee, and to the General Secretary, Mr. PROTA, for none can know better than I what their work and endeavours are worth and what they represent. On their behalf I tender to all our profound gratitude. (*Applause.*)

And now allow me, before concluding, and without my words being taken as a preterition of any kind, to make a special exception in favour of the representatives of the Spanish people.

It is at Seville, yes, at Seville that can be repeated with most force the affectionate gesture which throws a girl into the arms of her mother. We have never forgotten and we shall never forget that you are our children; we receive you with delight, with a true joy all the triumphal songs which you do not cease

to sing on the road of progress; we send you our paternal benediction and we wish that these ties of indestructible affection, these noble and pure sentiments which have presided at the formation of a race, thanks to which an epoque has been realized such as has never been seen since the war of Troy gives to our meeting a symbolic meaning; it must be that in the future, the struggles of life which should be the struggles of peace and love shall have a magnificent representation: America, daughter of Spain, on the other side of the Atlantic, and this side of the Atlantic, the aged mother, good and virtuous. (*Loud applause.*)

I have finished, Gentlemen. The hour has come, when having completed the scientific task which has been entrusted to you, you are going to return to your countries. On behalf of His Majesty's Government, tell your State ministers that they will always find here the most cordial, the most affectionate, the most honourable, the most sincere, the most pure attention and respect. Tell them that we who have been the spectators with saddened hearts and with eyes often filled with tears, of the catastrophes which must not occur again, we wish that when you meet one another among us, among our brothers of Humanity, for work of a scientific and practical character, the only thought be that of the peace which smiles at us and gladdens us, of peace founded on Love and on Work. (*Prolonged applause.*)

On behalf of His Majesty ALFONSO XIII, I declare the IVth International Road Congress closed.

The meeting closed at 5.10 p. m.

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# TEXT OF THE CONCLUSIONS ADOPTED

## BY THE CONGRESS

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### 1<sup>st</sup> SECTION. — Construction and maintenance.

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#### 1<sup>st</sup> QUESTION

##### Surfacing of Roads with Concrete.

I. Cement concrete carriage ways formed of materials of good quality in suitable proportions, built on sound and well drained foundations, are capable, if the work is carefully executed, of withstanding considerable traffic of heavy vehicles fitted with rubber tyres.

II. Under the conditions and for the kind of traffic specified in the first conclusion, such roadways are stable in a variety of climates.

They are smooth but not slippery, and the resistance they offer to tractive effort is slight.

When worn, they can serve as a foundation for other types of surfacing.

They are clean, give off little dust and allow water to flow away readily.

The necessary materials are to be found in nearly all countries.

Visibility is good during the night, and there is but little noise. Vehicles running on these roadways suffer little damage.

Against this, their repair, in case of serious damage, is difficult.

Very great care is necessary in their execution which demands close and constant supervision ; — traffic is necessarily interrupted for a considerable time. It is not easy to open trenches ; when cracks occur the appearance is unsightly.

III. Further investigations are required as to the effect upon road surfaces of traffic consisting of a large proportion of steel-tired vehicles.

IV. Materials for the concrete must be chosen with the greatest care. High grade cement should be used and clean water. The fine aggregate should be free from mud and organic matter, and only a very small proportion of clay should be admitted; an excessive proportion of fine particles should be avoided.

V. It is of prime importance that the concrete should be as compact as possible.

As a general indication based on previous practice and by way of rough approximation, one may quote the proportion in volume of  $1 \times 2 \times 3.5$  or its approximate equivalents, viz. — 400 kilos (1) of cement to 540 litres (2) of fine aggregate and 945 litres (3) of coarse aggregate. In each case, trials should be made with the materials available, so as to decide the proportion which will ensure a very compact concrete.

If the surfacing is executed in two coats, the concrete for the lower layer may be poorer.

The above quoted proportions only apply to Portland cement; the use of special cements may justify the adoption of different proportions.

VI. The bed or foundation must be drained and consolidated with the utmost care.

Drains must be laid below the level to which frost penetrates and at depths dictated by the nature of the soil. Where severe frosts are frequent, it is well to amplify this precaution by placing beneath the surfacing a layer of non conducting materials, such as coke, cinders, pulverised peat, etc.

VII. To obtain favourable results, it is indispensable to inspect the surfacing constantly and minutely during progress.

VIII. Wherever possible, the surfacing should be executed for its full width at a single operation.

IX. If the surfacing is in two layers the second layer must be placed in position before the setting of the first is complete and both layers rammed at one time.

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(1) 880 lbs.

(2) 118.8 gallons.

(3) 208 gallons.



Notwithstanding some Engineers think that they may be an advantage in not allowing the top layer to coalesce with the foundation, so as to permit this layer to contract and expand freely.

X. As regards the advisability of using mechanical plant, the question of economy should be considered in each case.

It is, however, very important for the strength of the concrete to employ an appropriate and well regulated quantity of water. It is advisable that the levelling, the tamping and the finishing be undertaken mechanically whenever this is possible. Moreover, to ensure a homogeneous mixture it is well to utilize concrete mixers supplied with suitable devices for regulating the quantity of water and duration of preparation.

The requisite proportion of water should form the subject of methodical study.

XI. It does not appear advisable at present to express an opinion as to whether reinforced concrete should be employed in preference to mass concrete and in what circumstances.

Studies and experiments should be continued upon this very interesting problem.

XII. Researches should be continued as to the means to be adopted for reducing to a minimum the formation of cracks.

XIII. In order to avoid accidents occurring to concrete roads as the result of expansion caused by variations of temperature and humidity, the introduction may be considered of expansion joints at distances to be determined in each particular case. The nature of the jointing materials and precautions to be adopted, both for this type of joint as well as for joints where work terminates, should continue to form the subject of experiments.

XIV. Apart from concrete roadways strictly so called, interesting results have already followed the adoption of a resurfacing method, whereby a matrix of sand and hydraulic lime or cement is added to the macadam during or subsequent to the laying. Investigations along these lines should be pursued.

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## 2<sup>nd</sup> QUESTION

### Use of Bitumen and Asphalt for Surfacing.

I. For modern roads, satisfactory results are obtained by the use of certain methods of surfacing called Bituminous or Asphaltic.

II. The Reports that have been presented show that success has attended the application of surfacing methods with asphalt and bitumen, both, in single and double coat work.

Satisfactory results have also been attained in the application of grouting and the laying of Asphaltic or bituminous blocks.

III. The methods of operation, manufacture and application of the mixtures as well as the qualitative determination of the ingredients, appear to be approaching standardisation. The same cannot be said of the quantitative determination : this depends upon climate, and traffic intensity and is, therefore, incapable of uniform solution. Moreover, regard must be had to economic considerations, the availability of local materials and the cost of transport.

The standardisation of aggregates and binders, which has been attained in certain areas, although perhaps tending to rapidity, simplicity and economy of work, is not always desirable as it is liable to lead to the application under widely different circumstances of unsuitable mixtures and in the outcome to unsatisfactory results from a road maintenance standpoint.

Furthermore, in the present state of the tests applicable to bitumens and asphalts, the specifications of these materials afford insufficient data for the choice of a binder without previous local experience.

#### IV. It is essential :

(a) To continue observations and investigations into the effects produced upon road maintenance by variations in the proportions of the ingredients of the aggregates, their respective dimensions and methods of mixing, seeing that the mixture must always be compact.

(b) To concentrate on the examination of the cause of waves and corrugations and the means by which they can be avoided.

(c) It is recommended, as a condition of success that surfacing work should be carried out in favourable weather and that particular care should be bestowed on so called accessory works, i. e. the preparation of the existing road bed as foundation, its drainage, its lateral abutment and adequate bond between the sub-crust and the surface as well as between the two coats, in case of need.

It is also recommended that investigations should be pursued into the standardisation of analyses and tests applied to bituminous materials.

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### 3<sup>rd</sup> QUESTION.

Laying tramway rails on the various kinds of road surfaces.

#### CONCLUSION OF A GENERAL NATURE

The reports submitted go to shew that one cannot indicate "a priori" the method of execution which is the most suitable for tram tracks. The solution of the problem is of principal importance from an economic point of view and, in each case, the system must be sought, which, while from a technical point of view providing guarantees of the greatest stability, will entail a minimum outlay on construction and on subsequent working expenses.

#### CONCLUSIONS

I. The laying of tramway-rails on a roadway is harmful to the maintenance of every kind of surfacing but the services rendered by tramways are of such vital public interest that every investigation should be made into methods calculated to reconcile the requirements of construction and maintenance of the carriage-way with those of the track.

Therefore, the method of execution which is applicable in each case, should be seriously studied, taking into account the nature of the soil, the plans and sections of the roads, the nature of surfacing and the requirements of general traffic.

The best solution will be, when this is possible, to lay the tramway on an independent track separated from the area reserved for general traffic.

II. It is necessary to investigate the manner of ensuring the maximum stability for the track from the point of view, on the one hand, of the good resistance of the surfacing and, on the other hand, of the reduction in the cost of maintenance; consequently whenever the nature of the surfacing or the conditions of general traffic require it, the track will be laid on a concrete foundation and secured to it by elastic and watertight devices.

When the tramway traffic and the weight of the cars are light the rails may be laid directly on the naturel soil if this consists of gravel or sand; in other cases on a bed of broken stone or ballast.

If the traffic is more intense and if the weight of the cars is medium, the rails may be laid on wooden sleepers bedded in ballast.

These two last systems of laying are not applicable when the surfacing is of wood, asphalt or concrete.

For all foundations of tracks every precaution must be taken to secure adequate means of drainage.

III. The most suitable type of rail to employ on roads, whatever the surfacing may be, is the grooved rail. The joints should, whenever possible, be welded; if not, the fish plates should be long and of a section which will accurately fit the rail.

Steps should be taken to prevent corrugations. Should they, however, occur, they should at once be attended to.

Points and crossings should be so constructed and maintained as to avoid shocks and concussion, thus ensuring the good condition of the track and eliminating or reducing noise and vibration. To the same end the motors and gears of the cars should be improved.

IV. In case of set paving a watertight joint should be made in such a manner as to ensure the perfect maintenance of the whole and avoid the infiltration of surface water. In the case of asphalt roads, one or two rows of sets should be laid between the rail and the asphalt jointed to the rail as mentioned above.

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## II<sup>d</sup> SECTION — Traffic and Development.

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### 4<sup>th</sup> QUESTION

#### Development of Transport.

I. Experience gained in nearly every country has demonstrated the indisputable utility of public motor vehicle services, firstly for the purpose of passenger and goods transport in districts unserved by railways and tramways, and secondly, in all those cases where the establishment and operation of railways and tramways would be too costly; it is therefore important that Governments and Local Authorities should endeavour to promote the development of motor transport by granting subsidies, where this is necessary, so as to ensure the provision of transport services — the subsidies being proportioned to the services rendered.

II. In order to encourage such development an effort should be made to lower the running cost. With this object it is desirable to continue experiments with a view to ascertaining the most economical motive power for these vehicles in each country.

III. The increase in Motor Vehicles must not be allowed to become a cause of excessive wear to the roads carrying them. It is essential that these vehicles should be so constructed as to conform to the standard adopted for the construction and maintenance of roads which, moreover, are continually being improved.

From this point of view it is important to encourage the study and adoption of all improvements in the construction of these vehicles which will have the effect of reducing the damage caused to public roads by fast or heavy traffic. Inter alia reference may be made to the experiments which have already been carried out with regard to tyres, the method of suspension, braking and especially with regard to the use of brakes on the greatest possible number of wheels, the introduction of shock absorbers, etc.

IV. Traffic on roads and highways should be facilitated whenever possible by doing away with obstructions such as level crossings, central gutters, etc., which cause inconvenience as well as danger, not only to the motoring public but also to every road-user.

For the purpose of improving road design the principal objects to be sought, apart from the surface improvement of carriageways which is dealt with in questions one and two, are the reduction of steep gradients, the provision of curves of long radius, good visibility, the reduction of crossfall and complete signposting, giving particulars of distances and possible dangers and obstructions, in general pursuance of the regulations and signs adopted by the International Conference held on 11th October 1909.

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## 5<sup>th</sup> QUESTION

### General Traffic Regulations.

I. As it is agreed that traffic regulations should be uniform in all countries, an International Diplomatic Conference should be held to determine standard regulations applicable to all the participating countries. At this conference suitable measures as to identification plates could also be adopted.

II. In the present state of the roads and in view of the diversity of their characteristics in different countries the limiting dimensions of vehicles cannot be defined in a general manner, but it is desirable that their maximum width overall should not exceed 2.50 m. (8 feet 3 inches). In exceptional cases special regulations may be imposed adapted to the nature and widths of the roads.

III. Pending the results of the experiments which are being carried out in different countries with regard to gross weight, the distribution of weight upon axles, the mode of suspension and the effect of various speeds upon different types of roadway, it would be possible with due regard to climatic conditions to adopt provisionally the following table which takes account of the total weight of the vehicle, the weight

on the most heavily loaded axle, the surfacing of the road and the nature of the tyres on wheels in determining the maximum speeds per hour.

TOTAL WEIGHT of the LOADED VEHICLE	WEIGHT on the most heavily LOADED AXLE	MAXIMUM SPEED IN KMS. (AND MILES) PER HOUR				
		RIGID RIMS	ORDINARY ROADS		SPECIAL ROADS	
			Elastic tyres		Elastic tyres	
			Ordinary	Pneu- matic	Ordinary	Pneu- matic
3,001 to 4,500 kg. (3 t. to 4 t. 5)	2,001 to 3,000 kg. (2 t. to 3 t.)	12 km. (7,5 miles)	25 km. (15,5 miles)	35 km. (1) (22 miles)	30 km. (19 miles)	45 km. (28 miles)
4,501 to 8,000 (4 t. 5 to 8 t.)	3,001 to 5,500 (3 t. to 5 t. 5)	8 km. (5 miles)	20 km. (12,5 miles)	30 km. (19 miles)	25 km. (15,5 miles)	40 km. (25 miles)
8,001 to 11,000 (8 t. to 11 t.)	5,501 to 8,000 (5 t. 5 to 8 t.)	5 km. (3 miles)	15 km. (9,5 miles)	20 km. (12,5 miles)	20 km. (12,5 miles)	30 km. (19 miles)
Over 11,000 (Over 11 tons)	Over 8,000 (Over 8 tons)	5 km. (3 miles)	8 km. (5 miles)	10 km. (6 miles)	15 km. (9,5 miles)	20 km. (12,5 miles)

(1) The speed of 35 km. (22 miles), in the case of passenger carrying vehicles may be increased to a maximum of 40 km. (25 miles) if the competent authorities consider that the strength of the road and the method of suspension of the vehicle justify this increase

IV. Except in so far as experience and the result of further investigation make modifications desirable, the conclusions of the Second Road Congress held in Brussels should be adhered to, i. e. the maximum pressure not to exceed 150 kg. (1) per centimetre of width of tyre, or  $C=150 \sqrt{d}$  applicable when the diameters of the wheel exceed 1 m.

V. a) If the configuration of the ground necessitates it all vehicles used for the transport of persons or goods should be provided with a brake.

b) Motor vehicles must have at least two systems of brakes with independent operation and transmission and these brakes must be sufficiently powerful to hold the vehicle on the steepest gradients.

c) The use should be prohibited of plates or any devices with studs or spikes which may ruin the road surface, also the locking of wheels or the use of any devices which skid on the surface of the road.

(1) 835 lbs per inch.

d) In hilly countries vehicles must be fitted with an appliance, acting independently of the brakes, which will prevent them running backwards on gradients.

VI. Notwithstanding the practical difficulties of regulating the movement of pedestrians and of animals on roads, the regulations should contain special provisions, with penalties for infringement, so as to compel pedestrians to use the highway without obstructing wheeled traffic, and the persons in charge of animals to control them in such a way as to allow the free passage of vehicles.

VII. It is of the greatest importance that regulations for traffic control should be made uniform throughout each country as soon as possible, thus eliminating the divergent regulations encountered in different parts of the same country — in populous areas and in open country respectively.

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#### 6<sup>th</sup> QUESTION

**The problem of traffic on congested roads and congested streets of towns.**

I. In ordinary cases and in spite of the insufficiency of existing regulations, it appears that these, if properly applied, should be sufficient to avoid congestion. When goodwill on the part of drivers and pedestrians is wanting the Police Authorities should possess the means of enforcing suitable penalties which each infringement deserves.

II. It is essential to draw up new Police Regulations with uniform provisions so as to render their international application practicable; these regulations should be as few in number as possible, very concise and extremely simple. The diversity between those at present in force draws attention to their imperfections or at least shows that they are not sufficiently precise to avoid questions arising as to their application.

III. To ensure their prompt enforcement the regulations should cover all matters relating to the road, the vehicle, the traffic and the administration. It appears advisable to base the



study of the question upon the regulations agreed upon at the Paris Road-Conference of 1921.

The reports contain sufficient data to facilitate examination of this proposal.

IV. Apart from the preceding conclusion, it would be advisable to lay down certain rules in order to enable populous towns to be adapted for present traffic, to prepare for the growth of traffic and also for the increase in speed which in so far as it can be effected with safety must be admitted to be a sign of progress. These rules would cover the following points :—

- a) The most suitable form of cross section for new streets and re-modelled old streets which will enable vehicles to make use of the whole width of the carriageway.
- b) The prohibition, in very busy streets, of standing places for vehicles next to the footpaths, parking space being provided, whenever possible, in convenient quarters of the town.
- c) Slow moving traffic should keep near to the footways to facilitate the passing of faster vehicles. The fast moving traffic should, where practicable, proceed some distance from the kerb so as to reduce the danger to pedestrians.
- d) Columns, lamp-posts, overhead wire standards, hoardings, etc., likely to constitute an obstruction or a danger to traffic, should not be erected :
  - 1° In the part of the street intended for wheeled traffic, except, in case of very wide streets, where they can be placed with the necessary protection.
  - 2° On pavements, too near the kerb.
- e) All applications to lay tramway lines in busy streets and squares should be rejected, and underground or overhead railways and motor omnibus services should be encouraged.
- f) Slow moving vehicles should be excluded from certain streets during certain hours where this is absolutely necessary, in order to facilitate general traffic in streets.

V. At street junctions and on approach roads to populous towns the construction of foot bridges and subways is recommended, as well as the provision of crossing-places marked by

distinctive colours. It would be well to increase the field of vision at admittedly dangerous places by giving a better and wider view at cross roads, by doing away with bad gradients, high walls, etc., which may obstruct the distant view.

VI. In towns growing in size and population provision should be made for the building of new approach roads, the construction of parallel relief highways and the widening of existing roads in advance of building operations.

VII. It is desirable that traffic at street junctions be regulated by giving preference to vehicles travelling along the main thoroughfare, and in order to indicate the classes of streets in an unmistakable manner it would be well to adopt a system of signals of international application. Pending the adoption of such an international system it would be possible to fall back, in certain cases, upon the system of giving priority to traffic coming from the right (or left according to the rule of the road which may be in force).

VIII. In very busy streets it would be advisable to separate the traffic running in opposite directions and where that is not possible owing to the narrowness of the streets, parallel streets, not very far apart, should serve the same purpose. The marking of the centre line on the roadway so as to guide traffic for the promotion of safety and increased traffic capacity may be useful in a number of cases.

IX. Rotary circulation is to be recommended in all suitable squares and street junctions where the intensity of traffic renders it necessary. Notice of such a regulation being in force should be given by a standard international sign.

X. Where possible streets should be divided by a limited number of refuges which, at the same time, would serve to « canalise » the traffic.

XI. In streets in which, owing to their insufficient width, it is not possible for this method to be adopted the holding-up of traffic is recommended at certain intervals by means of orders given by police officers, either directly or by mechanical means.

XII. Whenever possible, convenient secondary streets should, after the necessary preparation, be made available for the relief of the main streets.

XIII. Systems of electro-mechanical signalling should be studied, but these should only be adopted when practical experience justifies the assumption that they will be efficient. Each nation should inform the Permanent Commission of the Association of the experiments carried out and of the results obtained. The schemes submitted by the writers of some of the reports can be recommended in principle.

XIV. Whenever it is possible to adopt any other methods it is advisable to avoid railway level crossings on streets and roads.

XV. Special access roads, should be provided for exclusive use by traffic to docks and railway termini when the traffic in the existing streets renders it necessary.

XVI. The public should be educated by methods similar to those employed with success by the English and American « Safety First » and « Childrens Essay Competition » Organisations; such education to be introduced in the Primary Schools and spread abroad by all means available for modern propaganda.

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# FETES, RECEPTIONS and EXCURSIONS

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The Fourth Congress, like its predecessors, proved the occasion for a certain number of very interesting Receptions, Fêtes and Excursions.

The Local Organizing Commission, and the Municipality of Seville had, in fact, taken pains to prepare a varied and attractive programme, which made the Delegates' stay at Seville still more agreeable than might have been expected even from the choice of that celebrated city.

Let us add that, in order to facilitate Delegates' ride to the Palace of the Congress and their visit of the City, the Tramway Company of Seville offered delegates who carried their badge free conveyance over its whole system. This gracious act was very much appreciated, and we can only repeat here our hearty thanks to the Company.

## MAY 7

### Garden Party.

The first fête took place on Monday May 7, after the opening session of the Congress.

From 6 to 8 o'clock, a garden-party given by the Alcalde and the Municipality of Seville, brought together the Delegates and a large and fashionable gathering of Seville society in the wonderful gardens of the Exhibition, in which a performance was given by a military band.

Their Royal Highnesses Don Carlos de Borbón, and the Infantas Dona Luisa and Dona Isabel strolled about among the company.

At 7 o'clock a sumptuous repast was offered by the Municipality, under the Presidency of their Royal Highnesses, to the First Delegates of all the States represented at the Congress.

## MAY 8

**Organ recital.**

A magnificent performance was rendered upon the Cathedral Great Organ for the benefit of Members of the Congress from 5 to 7 p. m. Their Royal Highnesses Don Carlos and Dona Isabel as well as the Archbishop of Seville attended.

The programme which comprised the finest works of Spanish, French, Italian, German and Russian Composers was carried through with admirable skill by the eminent organist of the Cathedral : D. Roberto Almandoz.

**Gala performance at the San Fernando Theatre.**

On the evening, in the presence of Their Royal Highnesses, Don Carlos, Dona Luisa and Dona Isabel, a Symphony Concert was arranged by the organising Committee for the benefit of Members of the Congress in the fine San Fernando Theatre.

A most characteristic selection of Spanish music — Opera and dance — was performed with extraordinary brilliancy and finish which gave rise to enthusiastic applause.

The Concert terminated with a masterly rendering of Bach's Aria and the Overtures to the Freischutz and Tannhauser.

## MAY 9

**Tablada. — Training of bulls.**

At 5 o'clock on the aviation ground at Tablada, Delegates were given an opportunity to attend an essentially Spanish spectacle : the gambols and training of young bulls intended for the ring.

The pursuit by famous *picadores* whose skill was warmly applauded, and the evolutions of the beasts as they galloped across the plain afforded a most interesting entertainment and one full of originality for foreigners. Their Royal Highnesses honoured the occasion by their presence and the function was favoured by super weather.

The meeting was followed by tea which was lavishly served to the guests in the " caseta " of the hippodrome.

MAY 10

**Bull Fight.**

At 4,30, the Delegates attended a magnificent bull-fight in the Plaza de Toros, in the presence of their Royal Highnesses Don Carlos, Dona Luisa and Dona Isabel.

Two bulls were put to death by the well-known sportsman Don Antonio Canero, who fought both on horse back and on foot, and whose neatness and sure hand met with special applause. Six other bulls were then chased and put to death by the *espadas* Belmonte, Jimenez and Maera.

At the conclusion of the bull-fight, the "Corso" took place, or customary drive in carriages along the banks of the Guadalquivir, across the Park as far as the boundary of the City. This parade of carriages, most of them equipped with mules harnessed with bells and multi-coloured pompons was extremely picturesque and attractive and enabled the Delegates (as the carriages continually crossed one another) to see and get an idea of the elegance of Seville women.

**Andalusian Fete.**

At 10 p. m., on the premises of the "Caseta Circolo de los Labradores", the Members of the Congress were offered an opportunity by invitation of the Local Organising Committee of witnessing an Andalusian Fete.

In the presence of their Royal Highnesses the Infantas Don Carlos, Dona Luisa and Dona Isabel and a very select company of Seville Society, an exhibition of Andalusian Songs and Dances was given in costume.

The hall which was brilliantly illuminated presented a fairy-land appearance and formed a sparkling background in gorgeous hues.

The Members of the Congress will carry away a deep impression of this delicious entertainment.

## MAY 11

**Excursion to Alcala de Guadaira and Italica.**

At 2,30, a number of motor-cars took Delegates for a charming excursion which consisted in a tour over some 30 miles of road in the neighbourhood of Seville.

Leaving the city by the East, the route followed the main road to Alcala de Guadaira where it crossed the River Guadaira at the foot of the picturesque ruins of the ancient fortress of Alcala; then making a big detour by Dos Hermanas and recrossing the Guadaira at the approaches to Seville, it circled round the city, following the line of the ancient walls.

Then, passing to the right bank of the Guadalquivir at the Algaba Bridge and then over the river Huelva, the party came to the famous spot, Italica, birth-place of the Emperor Hadrian, and here a halt was made to visit the imposing ruins of the Roman amphitheatre and the Hotspring Baths. A splendid tea was served to the Delegates in the open air near the ancient ruins. Finally, the cars brought the excursionist back to Seville by Santipons, Camas and the picturesque suburb of Triana.

Though at one time threatened by a storm, the expedition was carried out under a heavenly sky.

On the way the attention of Delegates was attracted by samples of roads in concrete, tarmacadam and bituminous macadam that had recently been carried out under the supervision of Señor D. Ramirez DOMESTE, Engineer in Chief of the Province.

## MAY 12

At 5 o'clock, after the closing session of the Congress, a fête took place in the gardens of the Exhibition in front of the vast façade of the Palace of the Congress, organized by the Committee of the Exhibition. To this fête the Society of Seville and neighbourhood were invited, and the Delegates were also kindly asked to attend.

Under the title of "Fiesta de la Belleza Andaluza", the Organizers presented an entrancing spectacle of a poetic display under the leadership of H. R. H. the Infanta Dona Isabel, who was surrounded by nine young girls wearing the brilliant costumes of different parts of Andalusia.

Beneath the sun which cast its rays in streams upon the gold and glistening colours of the costumes, the oriflammes and the tapestries, and in the midst of the flowers and verdangreens of the gardens, the spectacle of this fête will live in the memories of those who were present as one of the most brilliant artistic presentations of the fêtes of by-gone days that it has ever been granted them to see.

### Banquet.

At 9 p. m., a great banquet, to which the Local Commission had graciously invited all the Delegates, took place in the rooms of the Caseta Circulo de Labradores, under the presidency of Mr. SENRA, Under-Secretary of State of the Fomento.

The number of guests exceeded 600, arranged at several tables.

The Official Delegates were all assembled at a large table of honour.

At the conclusion of dinner, Mr. LE GAVRIAN, General Secretary of the Permanent International Association of Road Congresses, made a speech in the name of President MAHIEU, who had been recalled to Paris and had been compelled to leave Seville in the afternoon. Mr. LE GAVRIAN thanked the organizers of the fêtes, in these terms :

MR. CHAIRMAN,  
LADIES AND GENTLEMEN

Our President, Mr. MAHIEU, having been compelled by the necessities of his duties at the French Ministry of Public Works, to take the train for Paris this evening, it has fallen to me to have the great honour of speaking here to-night, in the name of the Permanent International Association of Road Congresses, and presenting the excuses and regrets of its President.

I want, first of all, to perform a grateful duty in proposing the health of H. M. King Alphonso XIII, the high protector of the Fourth Road Congress. (*Applause.*)

Gentlemen, after the speeches which have been delivered this afternoon at the closing session of the Congress, there is no need for me to make a long speech. I want simply to say, once again, how touched the Permanent International Association and the many Members of the Fourth Road Congress have been by the welcome that they have received in Spain and by the splendid reception which has awaited them at Seville.



All our gratitude should go to the Local Organizing Commission, to the Committee of Honour, of the Fêtes and of the Receptions, to the Municipality of the Province, to the corporate Bodies and great Associations of the City and Province of Seville. I offer our warmest thanks to their Members, and in particular to :—

MM. Antonio VALENCIANO, General President of the Congress,  
OCHANDO y HERNANDEZ, Vice-Presidents,  
Luis PROTA, General Secretary,  
The Alcalde of Seville,  
The Governor of the Province of Seville,  
The Royal Commissioner of the Spanish-American Exhibition,

and to all those who have devoted their energies towards making our stay a delight at every moments.

We have worked hard this week and our labour has been fruitful : of this the conclusions of our debates are the proof.

But a prolonged effort of hard work can only be maintained by the introduction of some relaxation. What relaxations will ever have the value of the spectacles and the delights of Seville, with its gardens of bloom, its Exhibition, its monuments and the unforgettable memories which they call to life ? What relaxations will ever equal those artistic appeals with which we are, as it were, saturated, as though with the perfume of flowers in this exquisite capital of Andalusia ?

Once more, then, I say thank-you to our hosts for their hospitality which has been as magnificent as it has been cordial, to the Spanish Government that has been good enough to look with favour upon the holding of our meeting, and to his representatives, particularly to the Minister of Fomento who is so worthily represented here to-day by the Under Secretary of State.

In conclusion, may I ask Your Excellency to be good enough to express the respectful gratitude of the Permanent International Association of Road Congresses to H. M. King Alphonso XIII, for having deigned to accept the high patronage of our Fourth Congress and for having caused himself to be represented during our meetings by the Princes of His House, to whom we wish to express also all our thanks.

## LADIES AND GENTLEMEN,

In the name of the Permanent International Association of Road Congresses, I invite you to raise your glasses in honour of the great Spanish Nation and of the city of Seville. (*Loud applause.*)

His Excellency, Mr. SENRA, closed the entertainment by addressing to the Delegates and representatives of different countries a few words which were warmly applauded.

## MAY 13

## Excursion on the Guadalquivir.

At 2 p. m., more than four hundred Delegates embarked in front of the high quay of the Right bank below the Isabella the 2nd Bridge on a comfortable steam-boat on which the thoughtful hospitality of the Organizing Commission had arranged a luxurious buffet and placed a harmonious orchestra.

The objective of the excursion was to afford an opportunity of seeing the river which is the principal means of communication in the South of Spain, with the development of the port of Seville and the improvements in the waterway, and also to show the visitors the charms of the banks of the Guadalquivir.

The boat slipped his moorings and, first to the right and then to the left, the magnificent palace of San Telmo, the petrol depots of Salas, the brick-kilns of Los Remedios, were seen in turn, as well as a number of different public and private landing stages, especially the very original concrete ones of the Aznal-collar Co.

After passing the entry to the Alphonso XIII Canal, the scenery changed. Arrangements for landing or going on board were no seen except at greater and greater intervals. The eyes were now delighted by the deep horizons of the beautiful and fresh countryside of Andalusia. One could admire in turn the training grounds for bulls, the vast plain of Tablada, celebrated in the days of St Fernand, where the most important aviation ground in Spain is now established, the Hippodrome for pigeon-shooting, the Tennis, Golf and Polo-Grounds, the industrial hamlet of San Juan de Aznalfarache, dominated by the remains of an ancient Roman fortress, the pretty village of Gelves opposite the estuary of the Guadaira and that of Cona at the junction

with the river Pudio, the inhabitants of which devote themselves to fishing and the cultivation of corn, olives and silk-worms.

After reconstructing in imagination the ancient Roman city of Caura Siarum, of which numerous remains are still frequently found and which rose up in the neighbourhood of Cona, we passed La Puebla, la Isleta and its famous rosaries, and then telephone post n° 5, and it was with great regret that the travellers learned, a few miles further on, that the lateness of the hour made it necessary to turn about.

One would have been glad to prolong the excursion, to enter the wilder region which begins at the Jeronimos Canal and to go as far as the mouth of the Ilia, where, by the side of the prosperous Salt-basins which lie beside the estuary, the rich and luxuriant vegetation, the celebrated vineyards and the beautiful pine-forests which encircle the pretty town of San Lucas de Barramado with its temperate climate, must, by all appearances, have been quite charming.

It was necessary to bow to the captain's decision and we proceeded upstream again towards Seville, where we arrived at nightfall, after having enjoyed, during the last hour of daylight, some remarkable effects of the setting sun, glimpses of which the delegates will carry away with them as well as the deep impression that they have just made two passages through a port of the first order, the future of which will not belie the past.

### Night-Carnival.

From 10 o'clock onwards and during the whole night, a magnificent carnival, consisting of a promenade-concert in the brilliantly illuminated gardens of the Exhibition, and which the whole of the Society of Seville and the neighbourhood were invited to attend, was held by the Committee of the Exhibition. The Delegates at the Congress were also kindly invited. The spectacle of the gay costumes worn by the ladies : embroidered shawls, Andalusian combs in carved tortoise-shell, etc... was quite fairy-like. The halls of the Palace of the Exhibition had been transformed into ball-rooms and dancing went on to the accompaniment of the enchanting rhythm of the orchestras. Their Royal Highnesses the Infantes were present.

At 3 a. m. a sumptuous supper, presided over by their Royal

Hignesses was given to a number of distinguished guests including the General Secretary of the Association and the first Delegates of the Governments.

MAY 14, 15 and 16

### Excursion to Grenada and Cordoue.

On monday May 14, at an early hour, on one of those "triumphant mornings" which we grew to know in Spain, a party of 200 delegates set out in a special train for Grenada, after a final salute from the tower of the Giralda.

A long journey — for we only arrived in the afternoon — but a picturesque one, with long stops at the lively stations where we saw every type of Andalusia peasant.

At Grenada, some landaus (for there are still many horses in Spain) were waiting for us. We crossed the town and, after mounting a fairly stiff hill, reached the hotels which had been reserved for us on top of a hill adjacent to that on which were built the celebrated palaces of the Alhambra.

A sumptuous repast was given us by the Municipality of Grenada in the lovely garden of Mr. MERSMAN's villa "Beau Séjour", a garden with a terrace from which one could enjoy a marvellous view.

At our feet lay the town of Grenada, from which arose the sound of work mingled with numerous clock-bells, and where one could distinguish the open-work outline — the dome and the buttresses — of the cathedral.

To the right, the outside walls of the Alhambra and the slopes upon whose sides are dug the dwellings of the gitanos. Lower down runs the river torrent, which later traces its wandering course amidst the sandy clay.

If we turned to the other side of the town, our view embraced the snow-clad slopes of the Sierra Nevada and the pass by which the last of the Moorish kings, Boabdil, made his escape. It was there that, as he turned towards Grenada, he burst into tears (hence the name given to that spot : "El ultimo suspiro del moro"), while his mother Aicha said sternly to him : "Do not weep like a woman over that which you could not defend like a man".

So far we had seen nothing of the wonders of the Alhambra and yet already, overcome by the splendour of the setting sun

as it went down upon this magnificent spectacle, we understood the sighs and the tears of the Moor.

The following day, May 15, was devoted to visiting the town, especially the cathedral, the tomb of the catholic kings, and the Cartuja (the old Carthusian convent) and to visiting the Alhambra and the gardens of the Generalife.

It would be presumptuous to attempt a description of the Alhambra after that which has been given by Théophile Gautier : " You would think that the stroke of some magician's wand had wafted you off to the East, four or five centuries into the past ".

Besides, everyone has seen at least some photographs of the Ambassadors' Hall, the Hall of the Abencerages and the Fountain of Lions.

Our companions were dumb with admiration before this spectacle, one of the few which, despite its celebrity, surpasses in its actual beauty, and by far, all that has been attributed to it by the imagination.

The arrangement of the gardens of the Generalife was beautiful enough to attract and retain the notice of eyes that were still daggled by the Alhambra. It was not only the eyes that were charmed, but also the ears that were caressed by the fresh murmuring of the fountains and cascades.

### WEDNESDAY, MAY 16

An early start was made for Cordova, where we arrived at the commencement of the afternoon.

Motor-cars took us first of all to visit the Mesquita, a wonderful and impressive forest of columns, and then to make an excursion in the neighbourhood on the delightful wooded slopes at whose feet dawdled the Guadalquivir, and from which we enjoy a superb view.

The long line of carriages returned to the town and a splendid " merienda " was prepared for us at the Club by the generous organizers of the Cordovan fête.

In the evening, the train took us in the direction of Madrid, where we arrived the following morning, and from which we shall all before long return home, with our imagination full of wonderful memories of Andalusia.



# REGULATIONS

APPROVED BY THE PERMANENT INTERNATIONAL COMMISSION AT ITS MEETING OF THE 29TH MARCH 1909, AND REVISED ON JULY 31ST 1910.

MAY 6TH 1912, 20TH DECEMBER 1913, MAY 25TH 1914

JUNE 11TH 1921, JUNE 10TH 1922 AND NOVEMBER 24TH 1923

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## I. — Object and Organisation of the Association.

### ARTICLE FIRST

The object of the Permanent International Association of Road Congresses is to promote progress in the construction, traffic and exploitation of roads.

It continues the work of the first International Road Congress held in Paris in October, 1908.

It accomplishes its object :—

1. By organising Road Congresses;
2. By publishing Papers, Proceedings, and other Documents;
3. By collecting the results of : a) Tests carried out on roads; b) Laboratory tests throughout the world on materials which are used or are suitable for road construction and maintenance; these tests may be either in the form of mere records collected by the Association or they may have been carried out by the Association itself or through its instrumentality.

Its affairs are managed by a Permanent International Commission.

### ARTICLE 2

The Association consists of :—

1. Delegates of Governments and Corporations of all the countries which subscribe annually to the Association.

The term Corporation includes : Public departments, Provincial Governments, County, District, Communal and Municipal Bodies, Chambers of Commerce, Scientific or Technical Institutions, Tourist and Sporting Clubs, Professional Associations or Trade Unions, Transport Companies, Agricultural, Industrial and Commercial Firms, Societies or Companies, etc.

The number of Delegates is calculated, prorata, according to the amount of annual subscription (1). Thus :

- 1 Delegate for 250 francs in the case of Governments ;
- 1 Delegate for 100 francs in the case of Corporations.

The subscriptions or fraction of subscriptions inferior to this amount do not give the right to a delegate.

- 2. Of members entered as private members.

The admission is either permanent or temporary.

Permanent Members are entitled to attend and vote at every Congress.

Temporary Members are entitled to attend the particular Congress they have joined, and they may vote on all questions which do not affect the Permanent Association itself.

- 3. Honorary Members, nominated by the Permanent International Commission.

### ARTICLE 3

- 1. A Permanent International Commission, with headquarters at Paris, is at the head of the Association.

- 2. A Permanent Council and an Executive Committee are appointed from amongst the Members of this Commission.

### ARTICLE 4

The Permanent International Commission is composed of members belonging to the various countries represented in the Association. Each country has the right to one representative for each 1,000 francs of its total annual subsidy.

Provided, however, that the number of representatives from any one country shall not exceed 15 (fifteen), and that any country which pays not less than 250 francs shall have the right to appoint one delegate.

Furthermore, the General Presidents, the General Secretaries of the Road Congresses, the honorary Members and the old Members of the Executive Committee who have filled their office for 6 years, are ex-officio Members of the Permanent Commission.

At the head of the Permanent Commission there is a President, a Vice-President and a General Secretary who together constitute the Executive Committee.

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(1) GENERAL NOTE : All the sums mentioned in the present regulations are expressed in french francs.

This Commission :—

1. Determines when and where the first Congress shall be held.

2. Arranges at the proper time for the formation of a Local Organising Commission at the place selected for the Congress.

3. After consultation with the Local Organising Commission, determines the languages which shall be officially recognised by the Congress; prepares the Agenda and settles the questions to be submitted to the Congress as also the nature and number of the communications it shall deal with; arranges the business of the Meetings; and appoints the writers of Papers on the several questions.

4. Supports, when necessary, the Local Commission in its application to foreign Governments.

5. Approves the estimates of expenses to be defrayed out of the permanent funds of the Association; supervises the financial management; and decides, generally, upon all the administrative measures which it considers may promote the work of the Congress.

6. Nominates Honorary Members.

The Commission meets whenever it is convened by the Executive Committee, or upon the written requisition of a quarter of its Members addressed to the President of the Executive Committee, and, at any rate, at the time of the Congress Sessions.

The Permanent International Commission is alone competent to modify the rules; any proposed modification must be put on the Agenda of the Annual general meeting and adopted by a majority of the Members present.

The Members of the Permanent Commission, for whom it is not possible to attend a meeting may delegate their powers to one of the Members of the Commission.

#### ARTICLE 5

The **Permanent Council** is composed of representatives chosen from among the members of the Permanent Commission, namely :—

One for each country whose annual subsidy does not exceed 5,000 francs;

Two for each country whose annual subsidy exceeds this amount, and is less than 10,000 francs;



Three for each country whose annual subsidy exceeds 10,000 francs.

The President, Vice-President and General Secretary of the Permanent Commission are at the head of the Permanent Council.

The Permanent Council :—

1. Carries out the resolutions of the International Commission, and decides upon all questions not expressly reserved for the decision of the Commission.
2. Decides upon the admission of Corporations and Permanent Members referred to in Article 2.
3. Draws up the estimates to be defrayed out of the permanent funds of the Association, and assists and controls the Executive Committee.
4. After having requested proposals from the Local Commission the Council proceeds to appoint the General Committee and Sectional Committees of the next Congress, appointing as Vice-Presidents on each Committee three Members of the Permanent Commission who are familiar, as far as possible, with the languages officially recognised by the Congress, and it also appoints Secretaries who are well versed in these languages.
5. The Council meets whenever convened by the Executive Committee, or upon the request of a quarter of its Members addressed to the President of the Executive Committee.

#### ARTICLE 6

The **Executive Committee**, as stated under Article 4, is composed of the President, Vice-President and General Secretary of the Permanent Commission and of the Permanent Council. In addition to an Accountant, it may co-opt Secretaries who shall be specially entrusted with the translations and a Secretary who shall have special charge of the head office for laboratory experiments on materials used in the construction and maintenance of roads.

The Members of the Executive Committee shall belong to the country in which the head quarters of the Permanent Commission are situated.

It collects the records of experiments carried out on roads throughout the whole world and the records of laboratory tests in all countries on materials used in the construction and main-

tenance of roads; it arranges for fresh experiments to be carried out and if necessary carries them out itself.

It is specially concerned in specifying the conditions which shall be complied with by all those materials, whatever their nature, such as tars, mineral oils and other kindred products, which are used or can be used practically in the construction and maintenance of roads.

It attends to the despatch of current business, keeps the accounts, prepares the estimates of expenses to be defrayed out of the permanent funds of the Association, keeps the expenses within the limits of each heading of the approved estimates, signs cheques, and collects subscriptions and all other moneys due to the Association.

It deals with all investigations, tests, and occasional or periodical publications decided upon by the Permanent Council or by the Permanent Commission.

It has charge of the library, archives, documents and accounts.

It translates, when necessary, publishes and transmits to the Members of the Congress, the papers, communications, and proceedings of the Congress.

It shall administer the Funds of the Association and invest them in bonds of the French Government, in Debentures of the Railways guaranteed by the French State, or in Debentures of the Premium Bonds of the Crédit Foncier de France and of the City of Paris. It shall represent the Association in all judiciary actions.

#### ARTICLE 7

The representatives of the various countries, both on the Permanent Commission as well as on the Permanent Council, are appointed by the Governments of the respective countries in the proportions stated in Articles 4 and 5.

It devolves upon the Government of each country, whenever occasion arises, to fill vacancies which may occur amongst their representatives on the Commission or on the Permanent Council, through death or through the expiry of their term of office.

#### ARTICLE 8

Each Congress entails the appointment of a **Local Organising Commission** which includes the local Members of the Permanent Commission and holds office till the close of the Congress.

This Commission includes committees of patronage, administration, reception, excursion, and others.

It undertakes the propaganda in the country where the Congress is to be held, and, in accord with the Permanent Council, selects persons in that country for Presidents and Members of the Committees and Sectional Committees of the Congress.

It draws up, in consultation with the Permanent Council, the detailed programme of the Meetings, and distributes it to all the Members of the Congress at the opening of the Session.

It organises the various excursions, receptions, and fêtes.

It provides the rooms in which the Meetings are held.

It advises the Permanent Commission on the languages which may be officially recognised by the Congress and on the translations which have to be made for the Session; the language of the country in which the Congress is held, will have to be admitted, if required by the Local Commission.

It organises the service of correspondence, lodgings, interpreters, and helps where necessary the Permanent Commission in arranging at the expense of the Association for the translation and printing into the language of the country where the Congress is held, of Papers which have been written in any of the other languages officially recognised by the Congress.

Conversely it arranges at the expense of the Association for the translation into any of the other languages recognised by the Congress, of Papers which have been written in the language of the country where the Congress is held.

It puts the Permanent Commission into touch with the local authorities.

It presides over and conducts the Session of the Congress.

The subscription of each temporary Member is 50 francs, of which 20 francs are earmarked for the Association and the balance of 30 francs are the property of the Local Organising Commission to help towards its expenses. The latter is also entitled to the special temporary grants and subsidies received from Governments, Corporations and private Members, and if need be, a grant from the Association.

It will collect the whole of the 50 francs subscription, and remit direct to the Association, the share to which the latter is entitled.

It will keep special Accounts of the subsequent grant of the Association, and will not be at liberty to spend more than the amount in question without written authority from the Executive Committee.

## ARTICLE 9

The permanent funds of the Association are derived from :

1. The annual grants from Governments and Corporations.
2. The subscriptions of private permanent members :
  - a) Permanent membership involves an annual subscription of 20 francs, from the 1st of January 1922. This subscription is increased to 50 francs, for the first year, in the case of permanent members who are enrolled during a Congress year.
  - b) By a single payment of 200 francs, private permanent members may convert their annual membership to a life membership; this does not apply to corporations.
- No supplementary payment will be expected of life members who have acquired that qualification before the 1st of July 1921.
- c) Honorary Members pay no subscription.
3. Various donations and gifts.

## ARTICLE 10

1. The financial year commences on the first day of January.
2. Subscriptions are payable as follows :—

Permanent Members : at the time of enrolment, and on January of each year, in advance, to the Office of the Executive Committee.

Temporary Members : at the time of enrolment, to the Office of the Local Organising Commission.

The expenses of collection must be borne by the Members.

Special subscriptions may be solicited by the Local Organising Commission from the Members who take part in the excursions and fêtes during the Congress. Participation in these is optional, and the number of the participants may be limited.

## ARTICLE 11

Every Member is entitled :—

1. To take part in the Meetings of the Congress and to vote upon all questions figuring on the agenda.
2. To receive the publications of the Congress, in any one of the languages recognised by the Congress, which he may select. The Association is not bound, however, to replace copies which are lost or damaged in transit.

The delivery of these publications to those temporary members who have not registered their names at least one month before the Congress, cannot be guaranteed.

Permanent and honorary Members are further entitled :—

a) To lay before the Permanent Commission any questions to be submitted to the Congress. Such questions, accompanied by a concise report giving reasons for the same, must reach the Commission at least one year before the Meeting of the Congress.

b) To vote on all questions depending on the Permanent Association at the meetings of the Congress or at the special meetings.

c) To receive the publications distributed by the Association at other times than during the sessions of the Congress.

The number of copies of the publications delivered to Governments and Corporations is determined according to the number of their Delegates (art. 2).

The Corporations which, without paying the minimum annual subscription of 100 francs, which gives the right of nominating a Delegate to the Congresses (art. 2), desire nevertheless to receive a copy of all the publications, may obtain them on the payment of an annual sum of 50 francs.

#### ARTICLE 11 a

A Bulletin of the Permanent International Association of Road Congresses, is published by the Executive Committee, at least every three months.

This Bulletin is edited and published under the stipulations of articles 1, 6, 11 and 15 of these regulations. It consists of three identical editions, in German, English and French.

Manuscripts sent for insertion in the Bulletin are examined by the Executive Committee, who have power to accept or refuse them; its decision is final and can only be set aside by the Permanent Council. The refusal to print or accept an article must be notified to the author by registered letter within one month from the date of reception of the article, by the Executive Committee.

Extracts from Journal or Reviews must always mention their source very precisely.

In no case, can the Permanent Commission, the Permanent Council or the Executive Committee accept responsibility for the opinions and theories of their authors; neither can they enter into the question of copyright or priority of publication.

Any Member of the Association who shall have sent in an

article for insertion in the Bulletin, will be deemed to accept the following conditions if his article is accepted.

1. Articles must not be sent to other publications at the same time as they are sent to the Executive Committee for publication in the Bulletin.

2. These Articles must not be reproduced in extenso in any periodical or non-periodical publication before at least three months have elapsed after their publication in the Bulletin of the Association. When reproduced mention must always be made of the origin of the articles.

3. The Executive Committee reserve the right of inserting a special notice at the authors request to the effect that any particular article which has appeared in the Bulletin must not be translated nor reproduced, even after the three months delay hereinbefore mentioned, for a maximum period of three years.

Notification of the above stipulations will be made by the Executive Committee to the authors of Articles for the Bulletin at the time when their work is accepted.

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## II. — Session of the Congress.

### ARTICLE 12

The Permanent Commission convenes the Congress from time to time, at intervals of about three years, as nearly as possible.

### ARTICLE 13

1. The Congress comprises :—

Two Sections : One for the construction and maintenance of roads and the other for traffic and exploitation.

These Sections may be sub-divided.

2. Its proceedings consist of General Meetings, Sectional Meetings, Excursions and Receptions.

The number and nature of the questions to be discussed by the Congress are settled by the Permanent Commission. This Commission also settles the number and nature of communications which may be submitted to the Congress in addition to the ordinary programme of questions.

As a general rule each country shall only furnish one Paper on any given " Question " or topic of a " Communication ".

## ARTICLE 14

The reporter, or reporters, selected by the Commission for any given question or topic of a communication and for any given country, shall collect in that country all the data needed for the preparation of their Paper.

Their work, supported by conclusions if they deem these desirable, should reach the Executive Committee, at the latest, ten months before the opening of the Congress.

The Permanent Commission appoints a General Reporter for each question, whose duty shall consist of submitting to the Congress a short review of the chief features of this question, together with a summary of the Papers which have been transmitted to him.

The General Reporter may give his own views and data, and he may arrange with the various authors of Papers for formulating joint proposals. As far as possible, he shall belong to the country in which the Congress is held.

## ARTICLE 15

The Papers upon each " Question ", and also the General Reports must be forwarded to the Executive Committee within the limit of time allowed to their Authors; they will be translated and printed in the official languages of the Congress.

The Papers must be delivered to the General Secretary written in one of the official languages of the Congress, on the recto of the sheets only, in three type-written copies.

Each Paper should not exceed about 8,000 words, the number of illustrations inserted in the text should not exceed 6, and the total superficies occupied by them should not exceed 300 square centimeters.

The plates separate from the text (either drawings or half-tones) should not exceed two in number, except in special cases. Their size should not exceed 23.8 centimeters in depth by 45 centimeters in width, including the border line (or 22 centimeters by 43 centimeters within the border line).

The drawings should be made in clear black lines on tracing paper so as to allow blocks to be made from them if necessary.

Except by special decision of the Permanent International Commission, each Communication must be confined to 5000 words, and three illustrations in the text not exceeding 150 sq. cm in all, and one plate apart from the text.

The papers dealing with the subjects of communication are to be translated into the official languages of the Congress. They will not give rise to a general report and will only be discussed at the meetings of the Congress if time permits after the programme of *Questions* has been completely threshed out.

Beyond the communications referred to in the above Articles 13 and 14, which are printed at the expense of the Association, the Permanent Commission may admit communications printed by their Authors at their own expense; in the latter case the required number of copies must be supplied to the Executive Committee, and furthermore they will not be voted upon, nor brought up for consideration at a General Meeting.

Writers of Papers upon " Questions " or " Communications ", may, if they wish, furnish their own translations into the various official languages of the Congress.

#### ARTICLE 16

The " Questions " are first discussed at the Sectional Meetings and afterwards at a General Meeting.

#### ARTICLE 17

1. The deliberations, either at General Meetings or at Sectional Meetings are conducted in the languages officially recognised by the Congress, and also, when required, in the language of the country where the Congress is held.

The speakers, however, are authorised to use their own language under the express condition of translating or causing to be translated the words spoken into one of the three accepted languages of the Congress. This translation will appear in the transactions provided for under Article 20, and the original speech will only be mentioned as having taken place.

2. Unless otherwise decided by the Meeting, persons taking part in the discussions are not allowed to speak for more than ten minutes, nor can they address the same Meeting more than twice upon the same subject unless the Meeting, on being consulted, decides otherwise.

3. The discussion in Sectional Meetings or in General Meeting will be preceded for each question by a brief summary of the reports by the General Reporter who has been appointed under the terms of Article 14.



After discussing each question submitted to it, each Section may appoint one or more reporters to support in the General Meeting the conclusions they have adopted.

#### ARTICLE 18

Members of the Congress who have spoken at a Meeting must, within twenty-four hours, deliver to the Sectional Committee a summary of their remarks, to enable a report of the proceedings to be drawn up.

In the case where the summary has not been submitted, the wording adopted by the Secretary or even the mere heading will be mentioned instead.

The Committee shall have the right to request the author to abridge his summary, and should it not have been revised and amended in due time, the Committee will undertake the abridgement.

#### ARTICLE 19

The summary of the discussions, arranged and edited by the Sectional Committees, together with the various conclusions adopted by the majority of the Members voting, are transmitted by the General Reporter to the Permanent Council the day before the last General Meeting and they are then laid before the latter where they are discussed and voted upon.

#### ARTICLE 20

A detailed report of the Proceedings of each Section of the Congress is prepared by the Executive Committee assisted by the Committee of the Congress and especially by the Vice-Presidents and Secretaries mentioned in Article 5.

As regards the General Meetings and Excursions, a similar report is prepared by the General Secretary of the Session within the shortest time.

The joint record so compiled is published, under the direction of the Executive Committee, in the languages officially recognised by the Congress.

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### III. — Dissolution of the Association.

#### ARTICLE 21

The dissolution of the Association can only be effected at a Congress specially convened for the purpose, and must be approved by a majority of three-fourths of the Members present and entitled to vote.

#### ARTICLE 22

1. In the event of its dissolution, the liquidation of the accounts of the Association shall be undertaken by the Permanent Commission.

2. The final assets of the Association shall, under its guidance, be devoted to philanthropic or technical objects relating to roads.

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### REGULATIONS FOR THE LABORATORY

PASSED BY THE PERMANENT INTERNATIONAL COMMISSION  
AT THEIR MEETING HELD ON 31ST JULY 1910

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ARTICLE FIRST. — The Permanent International Commission shall determine each year the nature and the extent of the research work of the Laboratory which the Executive Bureau is authorised to undertake during that period.

ART. 2. — The substances required for the research work and the necessary analyses will be collected by the Executive Bureau.

The results of the research work of the Laboratory shall be the exclusive property of the Association: they will be sent to all the Members of the Association, in the form of an annual report of the Executive Office, with a simple indication of the source of origin. The names and the social status of the suppliers of the samples shall only be published with their written consent.

ART. 3. — The report shall not contain any criticism on the relative value of the various products analysed or experimented with.

ART. 4. — No paid analyses for third parties, even if Members of the Association, will be made by the Executive Bureau.

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## SPECIAL BY-LAWS OF THE CONGRESS

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ARTICLE 1. — In conformity with the decisions of the Royal Government of Spain and of the Permanent International Association of Road Congresses, a Fourth International Road Congress will be held in Seville in 1923.

ARTICLE 2. — The Regulations of the Permanent International Association of Road Congresses, approved on the 29th of March 1909 and revised in the last instance on the 11th of June 1921 are applicable to this Congress.

ARTICLE 3. — This Congress will be opened on the 7th of May 1923, and will remain open for six days.

ARTICLE 4. — The following are Members of the Congress :—

1) The specially appointed delegates of the Royal Government of Spain and of other Foreign Governments as well as the Members of the Permanent International Commission of Road Congresses;

2) The *permanent Members* of the Permanent International Association of Road Congresses;

3) The *temporary Members* of the said Association who have sent in their applications and subscriptions to the General Secretary of the Local Organising Committee before the opening of the Congress, or who propose to register during its continuance.

The *temporary Members* of the Permanent International Association of Road Congresses, include all Members whose names have been recorded for the purpose of taking part in the Fourth Congress only, viz :—

a) The delegates selected for this purpose by public administrations provisional governments, counties or departments, towns. District Authorities, chambers of commerce, automobile, cycle and touring clubs, agricultural societies, scientific societies, transport companies by road or rail, technical societies and firms, industrial and commercial undertakings.

b) Private Members.

The subscription of all temporary Members of the Permanent Association of Road Congresses (classes A and B) as well as of the Delegates to the IVth congress from Governments who have not yet joined the Association or been Donors to the Congress is fixed at fifty francs (50 francs).

The payment of a sum of one hundred francs (100 francs) gives the right to a Donor Membership.

ARTICLE 5. — Persons belonging to the family of a Member of the Congress may take part therein as Associate Members on the payment of 15 francs.

ARTICLE 6. — All persons on the list of the participants of the IVth Congress, under whatever head they may be entered, must comply with the terms of these special By-Laws, and with those of the Regulations of the Permanent International Association of Road Congresses.

Every temporary Member or Associate Member will receive a Members ticket issued by the Local Organising Committee. Every Member of the Association receives a ticket, similar to the above as Member of the IVth Congress from the General Secretary of the Association.

These tickets are strictly personal; they allow the bearers to be present at the sessions of the Congress, and to take part in all receptions and excursions.

The cost of the excursions is not included in the subscriptions; each Member or Associate pays for the excursions he takes part in.

ARTICLE 7. — The Congress consists of :—

I. — General Assemblies.

II. — Section meetings.

III. — Excursions.

ARTICLE 8. — The work of the Congress is divided into two sections, viz :—

FIRST SECTION : Construction and Maintenance;

SECOND SECTION : Traffic and Administration.

Each sub-section has its own executive committee appointed in accordance with the terms of Article 5 of the Regulations of the Permanent International Association, and its discussions are distinct from the other.

ARTICLE 9. — Members of the Congress alone have the right to present papers and to take part in the discussions. This right is not extended to Associates, nor do the latter receive the publications of the Congress.

ARTICLE 10. — Spanish, English, and French are the languages adopted for the Congress.

ARTICLE 11. — Should any question arise not provided for by the By-Laws, it will be decided by the Bureau of the Congress and by the Permanent International Commission of Road Congresses.



## Various pamphlets distributed during the Congress

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### 1° Artistical documents.

Editions of the « *Comisaria regia del Turismo y Cultura artistica* »,  
*Seville* (Monuments, Museums).

*Grenade* (Alhambra 1°, Alhambra 2°).

*Seville*, Cité-Jardin (Barrio de Santa-Cruz).

*Excursion a Toledo*.

*Desde Madrid a Sevilla por Extremadura*.

*El Generalife* (noticias e indicaciones por el Marqués de la  
Vega Inclan).

*America Espanola o Hispano America* (el termino America-  
latina es erroneo).

*Notas sobre Turismo Hispano Americano* (dedicadas al primer  
Congreso Nacional del Comercio español en Ultramar), por  
el Marques de la Vega Inclan.

### 2° Miscellaneous.

" *Asland* " (Ciment Portland artificiel), 15, place du Palais,  
Barcelone.

" *Recuerdo de Sevilla* ", " *Cementos* ", " *De Sevilla a dos  
Hermanas* ".

*Compania Peninsular de Asfaltos, S. A.*, Avenida del Conde de  
Peñalver 21, Madrid.

" *Allied Machinery Company* ", Consejo de Ciento 318, Bar-  
celone : " *Las Carreteras de hormigón en Espagne* ".

*U. Ammann*, Constructeur à Langenthal (Suisse).

*Corpet, Louvet & Co*, 5, rue Gambetta, La Courneuve (Seine), (France), (Constructions mécaniques, Chaudronnerie, Rouleaux compresseurs).

*Advance made from the point of view of modern mechanical equipment used for the construction and maintenance of roads.* — Communication by Ing. Emilio GOLA y Co, Milan.

*The surfacing "The indeformable"* (M. GUIET, Agent voyer en chef à la Roche-sur-Yon (Vendée) (France).

*Marshall, Hijos & Co Limited*, Gainsborough (Angleterre).

*Metzger*, Constructeur à Barcelone, 76, Pases de Gracías.

"*Roads and Road Construction*", Technical Review, 83, Farrington Street, Londres (May 1st 1923).

"*Roads and Traffic*", Technical Review : 37, 38, Strand, London.

"*Sanson*" Plaza de Canalejas, 6, Madrid (Ciment Portland artificiel).

"*Westrumite*". — La Route Asphaltique. — 25, Victoria Street, Westminster, London.



# COMMISSION INTERNATIONALE PERMANENTE

## PERMANENT INTERNATIONAL COMMISSION

### COMISION INTERNACIONAL PERMANENTE

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	<i>Président — President — Presidente :</i>
	M. MAHIEU, Sénateur, Inspecteur Général des Ponts et Chaussées, à Paris.
<b>Bureau exécutif</b> —	<i>Vice-Président — Vice-President — Vice-Presidente :</i>
<b>Executive Committee</b> —	M. DEFERT (H.), Président du Touring- Club de France, 65, Avenue de la Grande-Armée, Paris.
<b>Oficina Ejecutiva</b>	<i>Secrétaire Général — General Secretary — Secretario General :</i>
	M. LE GAVRIAN (P.), Ingénieur en Chef des Ponts et Chaussées, Professeur à l'Ecole Nationale des Ponts et Chaus- sées. à Paris.

#### Membre d'Honneur — Honorary Member — Miembro de Honor

M. BALLIF (A.), Ancien Président du Touring-Club de France,  
Ancien Vice-Président du Bureau Exécutif de l'Association  
Internationale Permanente des Congrès de la Route, à  
Paris.



**Membres de droit — Ex-officio Members' —  
Miembros de derecho :**

*Présidents Généraux des Congrès —  
General Presidents of Congresses —  
Presidentes Generales de los Congresos :*

2 <sup>e</sup> Congrès — 2 <sup>nd</sup> Congress - 2 Congreso Bruxelles — Brussels 1910.	M. LAGASSE DE LOCHT, Directeur Général Honoraire des Ponts et Chaussées, 167, Chaussée de Wavre, Bruxelles.
3 <sup>e</sup> Congrès — 3 <sup>rd</sup> Congress 3 Congreso Londres — London 1913.	Sir George S. GIBB, South Cor- ner, Alan Road, Wimbledon S. W. 19.
4 <sup>e</sup> Congrès — 4 <sup>th</sup> Congress 4 Congreso Séville — Sevilla 1923.	Sr. D. A. VALENCIANO Y MAZERES, Sub-Director de Obras públi- cas, Ingeniero Jefe de Caminos, Canales y puertos y abogado, Ministerio de Fomento, Madrid.

*Secrétaires Généraux des Congrès —  
General Secretaries of Congresses —  
Secretarios Generales de los Congresos :*

	MM. Messrs. Sres.
1 <sup>er</sup> Congrès — 1 <sup>st</sup> Congress 1 Congreso Paris, 1908.	HEUDE (Henry), Inspecteur Géné- ral des Ponts et Chaussées en retraite, ancien Professeur à l'Ecole Nationale des Ponts et Chaussées, 127, boulevard St- Germain, Paris.
2 <sup>e</sup> Congrès — 2 <sup>nd</sup> Congress 2 Congreso Bruxelles — Brussels 1910.	WALIN, Directeur Général hono- raire des Ponts et Chaussées, 56, rue des Eburons, Bruxelles.

MM. Messrs. Sres.

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|--|---|
| <p><b>3<sup>e</sup> Congrès. — 3<sup>rd</sup> Congress</b><br/> <b>3 Congreso</b><br/> <b>Londres — London</b><br/> <b>1913.</b></p> | <p><b>REES JEFFREYS</b> (William), Chairman of the Roads Improvement Association, 15, Dartmouth Street, Westminster, London, S. W. 1.</p> |
| <p><b>4<sup>e</sup> Congrès — 4<sup>th</sup> Congress</b><br/> <b>4 Congreso</b><br/> <b>Séville — Sevilla</b><br/> <b>1923.</b></p> | <p><b>Sr. D. Luis PROTA</b>, Jefe de Administración, Ministerio de Fomento, Madrid.</p>   |

### Membres — Members -- Miembros :

#### Algérie — Algeria

MM. Messrs. Sres.

**RABY**, Inspecteur Général des Ponts et Chaussées, Directeur des Travaux Publics de l'Algérie.

#### Argentine — Argentina

**-GIRADO** (José), Ingénieur civil, 16, rue Franklin, Paris (16<sup>e</sup>).

#### Australie — Australia

N.....

#### Belgique — Belgium — Bélgica

**GEVAERT** (E.), Directeur Général des Ponts et Chaussées, 38, rue de Louvain, Bruxelles.

**LAMBIN**, Inspecteur Général des Ponts et Chaussées, Directeur Général des Routes et des Bâtiments Civils, 38, rue de Louvain, Bruxelles.

**VAN DER SCHUEREN**, Inspecteur Général des Ponts et Chaussées, 88, avenue Victor-Jacobs, Etterbeek, Bruxelles.

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N.....

#### Chine — China

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**Finlande — Finland — Filandia**

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### **Grande-Bretagne — Great Britain — Gran Bretaña**

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**Grèce — Greece — Grecia**

MM. Messrs. Sres.

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**Inde Anglaise — British India — India Inglesa**

N.....

**Indes Néerlandaises — Dutch Indies — Indias Holandesas**

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**Indo-Chine — Indo-China**

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**Etat libre d'Irlande — Irish free State**

Estado libre de Irlanda.

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**Irlande du Nord — Northern Ireland — Irlanda del Norte**

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**Italie — Italy — Italia**

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**Luxembourg — Luxemburg — Luxemburgo**

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**Maroc — Morocco — Maruecos**

MM. Messrs. Sres.

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**Norvège — Norway — Nøruega**

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**Pays-Bas — Holland — Paises-Bajos**

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**Pologne — Poland — Polonia**

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**Portugal**

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MM. Messrs. Sres.

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**Suède — Sweden — Suecia**

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**Suisse — Switzerland — Suiza**

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**Tchéco-Slovaquie — Czecho-Slovaquia — Checo-Eslovaquia**  
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**Tunisie — Tunis**

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**DÉLÉGUÉS DES GOUVERNEMENTS**  
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MM. Messrs. Sres.

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**Ceylan — Ceylon — Ceilán**

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**Chili — Chile**

AMUNATEGUI (Francisco), Délégué de la Commission des Com-  
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**Chine — China**

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MADSEN (Lt-Colonel), Inspecteur Général des Ponts et Chaussées,  
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**Dominicaine (République) — Dominican Republic —  
Dominicana Republica**

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**Espagne — Spain — España**

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**Esthonie — Esthonia — Estonia**

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MM. Messrs. Sres.

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BOURGEOIS, Ingénieur en Chef des Ponts et Chaussées à  
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**Gibraltar**

COAD (Major H. E.).

PEARCE (Major W. H.).

**Grande-Bretagne — Great Britain — Gran Bretaña**

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SATO (Toshiyasu), Ingénieur au Ministère de l'Intérieur, Tokio.

#### **Kénia — Kenya**

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**Maroc — Morocco — Maruecos**

MM. Messrs. Sres.

DELPIT, Ingénieur en Chef, ff<sup>ons</sup> d'Inspecteur Général, Directeur des Travaux Publics à Rabat.

**Mexique — Mexico — Mejico**

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**Monaco**

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**Norvège — Norway — Noruega**

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**Nouvelle-Zélande — New Zealand — Nueva Zelanda**

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**Panama**

PAREDES (Don Paul G.), Consul de Panama à Séville.

**Paraguay**

COMINES Y APENTE (Salvador), Consulat de Paraguay, Séville.

**Pays-Bas — Netherlands — Países-Bajos**

GELINCK (W. G. C.), Ingénieur en Chef, Directeur du « Rijkswaterstaat », Haarlem.

VAN HEIJST (R. D. A.), Ingénieur en Chef des Ponts et Chaussées, La Haye.

**Pologne — Poland — Polonia**

MINCHEJMER, Ingénieur, Inspecteur des Routes au Ministère des Travaux Publics, Varsovie.

**Portugal**

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**Roumanie — Roumania — Rumania**

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**Serbes, Croates et Slovènes (Royaume des) — Serb, Croat and Slovene (State) — Servia, Croacia, Eslovenia**

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**Siam**

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**Suède — Sweden — Suecia**

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**Suisse — Switzerland — Suiza**

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**Tchéco-Slovaquie — Czecho-Slovaquia — Checo-Eslovaquia**

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**Tunisie — Tunis**

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**Uruguay**

FERNANDEZ Y MEDINA (Don Benjamin), Représentant de l'Uruguay à Madrid (Légation de l'Uruguay).

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427 SOCIEDAD CIENTIFICA ARGENTINA, Cevallos 260, Buenos-Aires.

658 TOURING-CLUB ARGENTINO, Avenida de Mayo, 760 (6° piso), Buenos-Aires.

### Fédération Australienne — Australia

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454 COUNTRY ROADS BOARD, Melbourne (Victoria).

468 VICTORIAN INSTITUTE OF SURVEYORS, 57-9, Swanton Street, Melbourne.

673 WESTERN AUSTRALIA (Agent General for), Savoy House, Strand London W. C. 2.

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- 499 ADMINISTRATION COMMUNALE DE BRUXELLES.
- 416 ADMINISTRATION COMMUNALE DE GAND.
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- 455 ADMINISTRATION COMMUNALE DE SCHAEERBEEK-LEZ-BRUXELLES.
- 415 ADMINISTRATION COMMUNALE DE VERVIER.
- 424 ADMINISTRATION DE LA PROVINCE D'ANVERS.
- 616 ADMINISTRATION DE LA PROVINCE DE BRABANT, Bruxelles.  
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- 509 ADMINISTRATION DE LA PROVINCE DE HAINAUT.
- 532 ADMINISTRATION DE LA PROVINCE DE LIÈGE, Palais Provin-  
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G. LOPPENS, Ingénieur en Chef Directeur du Service  
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- 062 ASPHALT-BLOCK PAVEMENT à Lessines.
- 461 ASSOCIATION DES EXPLOITANTS DES CARRIÈRES DE PORPHYRE,  
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- 430 DÉPUTATION PERMANENTE DU CONSEIL PROVINCIAL, DU LIMBOURG, à Hasselt.
- 650 FÉDÉRATION NATIONALE BELGE DU BÂTIMENT ET DES TRAVAUX PUBLICS, 52, rue de la Montagne, Bruxelles.
- 452 GOUVERNEMENT PROVINCIAL DE LA FLANDRE OCCIDENTALE, Bruges.  
M. P. DE GRAER, Ingénieur Provincial, 23. rue des Sœurs Noires, Furnes.
- 640 LIGUE VÉLOCIPÉDIQUE BELGE, 8, place des Martyrs, Bruxelles.
- 345 ROYAL AUTOMOBILE-CLUB DE BELGIQUE, 63, rue de la Régence à Bruxelles.  
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- 442 SOCIÉTÉ ANONYME MINERVA MOTORS (Automobiles), 40, rue Karel Ooms, Anvers.
- 528 SOCIÉTÉ NATIONALE DES CHEMINS DE FER VICINAUX, 14, rue de la Science, à Bruxelles.  
M. CAURIEZ, Directeur général.
- 302 SOCIÉTÉ SOLVAY ET C<sup>ie</sup>, 33, rue du Prince-Albert, Bruxelles.
- 630 SOCIÉTÉ ANONYME « LE SOLIDITIT BELGE », 10, rue du Moniteur, Bruxelles.  
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- 518 KONGELIG NORSK AUTOMOBILKLUB, Hvitfeldsgate, 1, *Chris-  
tiania*.

M. J. MUNCH, Ingénieur en Chef des Ponts et Chaussées,  
Vice-Président du Conseil d'Administration du  
Kongelig Norsk Automobilklub.

SVERRE STRAND, Ingénieur, Membre honoraire et  
ancien Président du Club Motocycliste de Nor-  
vège.

**Pays-Bas — Holland — Paises-Bajos**

- 398 BOND VAN NEDERLANDSCHE BAKSTEENFABRIKANTEN, St-Joriss-  
traat, 28, *Nimègue*.

- 372 INSTITUT ROYAL DES INGÉNIEURS NÉERLANDAIS, Prinsesse-  
gracht, 23, *La Haye*.

- 307 TOURING-CLUB DES PAYS-BAS (A. N. W. B.), Parkssstraat, 18,  
*La Haye*.

M. STEFFELAAR, Président du Comité des Routes.

- 502 VEREENIGING HET NEDERLANDSCHE WEGENCONGRESS, Parks-  
straat, 18, *La Haye*.

M. H. W. C. DE BRUYN, colonel tit. du Génie, Secrétaire.

- 361 VILLE D'AMSTERDAM, Administration des Travaux publics,  
Hôtel de Ville, *Amsterdam*.

- 340 VILLE DE LA HAYE, Bierkade n° 4, *La Haye*

- 655 VILLE DE ROTTERDAM, Stadslimmerhuis, Harengoliet n° 4,  
*Rotterdam*.

**Pologne — Poland — Polonia**

- 552 AUTOMOBILKLUB POLSKI, Rue Ossolinskich, 6, Varsovie.  
669 VILLE DE CRACOVIE, Hôtel de Ville, Cracovie.

**Portugal**

- 379 ASSOCIAÇÃO DOS ENGENHEIROS CIVIS PORTUGUESES, Praça do Comércio, Lisboa.  
603 CAMARA MUNICIPAL DO PORTO.  
647 AUTOMOVEL-CLUB DE PORTUGAL, Largo do Calhariz 29, Lisboa.

**Roumanie — Roumania — Rumania**

- 393 AUTOMOBILE-CLUB ROYAL ROUMAIN, Bucarest.

**Suède — Sweden — Suecia**

- 362 KUNGL. AUTOMOBIL KLUBBEN, Nybrogatan, 3, Stockholm.  
657 SVENSKA TEKNOLOGFORENINGEN (ASSOCIATION SUÉDOISE DES INGÉNIEURS ET DES ARCHITECTES), Stockholm.  
Mr. Gust. DAHLBERG, civil Ingenior.  
575 VASTRA SVERIGES GATSTENS INDUSTRIIDKAREFORBUND, Östra Hamngatan, 30, Gothenbourg.

**Suisse — Switzerland — Suiza**

- 420 AARGAU (BAUDIREKTION DES CANTONS) Aarau, Suisse  
374 CANTON DE NEUCHÂTEL (DÉPARTEMENT DES TRAVAUX PUBLICS DU), Château-de-Neuchâtel, Neuchâtel.  
410 CANTON DU TESSIN, Bellinzona.  
381 CANTON DE VAUD (DÉPARTEMENT DES TRAVAUX PUBLICS DU), à Lausanne.  
M. SIMON, Chef du Département.  
418 CANTON DE ZÜRICH (DÉPARTEMENT DES TRAVAUX PUBLICS DU), à Zurich.  
619 SOCIÉTÉ « LE VIALIT », Bacholdstrasse 7, Zurich.

- 402 UNION SUISSE DES PROFESSIONNELS DE LA ROUTE (VEREINIGUNG SCHWEIZ STRASSENFACHMÄNNER), Selnastr. 11, Zurich I.
- 335 VILLE DE BERNE (Bern, Stadtbaudirektion I).
- 674 VILLE DE LAUSANNE (DIRECTION DES TRAVAUX DE LA).
- 306 VILLE DE ZURICH (CONSEIL D'ADMINISTRATION DE LA).

**Tchéco-Slovaquie — Czecho-Eslovaquia — Checo-Eslovaquia**

- 542 BEZIRKSVERWALTUNGS-KOMMISSION, Carlsbad.
- 537 BRNO (MESTSKY STAVEBNI URAD) (Direction des Travaux municipaux).
- 524 COMITÉ EXÉCUTIF DU PAYS BOHÈME (Section des Ponts et Chaussées), Prague III/6.
- 541 CSL. KLUB AUTOMOBILISTU, Prague 1.

**Tunisie — Tunis**

- 620 COMMUNE DE BÉJA.
- 538 COMPAGNIE FERMIÈRE DES CHEMINS DE FER TUNISIENS, 8, rue Lavoisier, Paris.
- 535 COMPAGNIE DU GAZ ET RÉGIE CO-INTÉRESSÉE DES EAUX DE TUNIS, 122, rue de Serbie, Tunis.
- 544 COMPAGNIE DES PHOSPHATES ET DU CHEMIN DE FER DE GAFSA, 60, rue de la Victoire, Paris.
- 539 COMPAGNIE DU PORT DE BIZERTE, à Bizerte.
- 543 COMPAGNIE DES PORTS DE TUNIS, SOUSSE ET SFAX, place du Phare, à Tunis.
- 382 DIRECTION GÉNÉRALE DES TRAVAUX PUBLICS DE LA RÉGENCE DE TUNIS, à Tunis.
- 676 LA TUNISOISE INDUSTRIELLE, 26, rue Es-Sadikia, Tunis.
- 568 VILLE DE BIZERTE.
- 591 VILLE DE MAHDIA.
- 671 MUNICIPALITÉ DE SFAX.
- 523 VILLE DE SOUSSE.
- 607 VILLE DE TÉBOURBA.
- 508 MUNICIPALITÉ DE TUNIS.



## MEMBRES A TITRE INDIVIDUEL

*Les noms des « Membres à vie » sont précédés par un \*.*

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## MIEMBROS A TITULO INDIVIDUAL

*Los nombres de los « Miembros vitalicios » estan precedidos de un \*.*

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### Algérie — Algeria

MM. Messrs. Sres.

- 1406 POLPET (Emile), Ingénieur en Chef des Ponts et Chaussées, Directeur adjoint des Travaux Publics, 155, chemin Telemly, Villa Lonjali, Alger.
- 1440 VICAIRE, Ingénieur en Chef des Ponts et Chaussées, 20, rue Henri-Martin à Alger.

### Argentine — Argentina

- \*1542 AMENGUAL (Bartolomé R.), Ingénieur Civil, Tres Arroyos (Pcia Buenos-Aires).
- \*1842 ANÓN SUAREZ (Vicente), Ingeniero Civil, Profesor en las Universidades de la Plata y Buenos Aires, Defensa 1111, Buenos-Aires.
- \*1541 BARBAZAN (Antonio J.), Ingénieur Civil, Pergamino (Pcia Buenos-Aires).
- \*1540 BONTEMPO (Ernesto), Ingénieur Civil, Pergamino (Pcia Buenos-Aires).
- \*1545 DELGADO (Feliciano), Ingénieur Civil, Mercédès (Pcia Corrientes).

## MM. Messrs. Sres.

- \*1544 DURANONA (Valentin B.), Ingénieur Civil, Peru 857, Buenos-Aires.
- \*1550 GIRADO (Jose), Ingénieur Civil, Membre de la C. I. P. des Congrès de la Route, 16, rue Franklin, Paris.
- \*1549 GIRADO (Jorge A.), Ingénieur Civil, Tacuari, 939, Buenos-Aires.
- \*1843 LAURENCENA (Alberto F.), Ingeniero Civil, Rivadavia 64, Paraná E. R.
- \*1546 LISSARAGUE, Ingénieur Civil, Mercedes (Pcia Corrientes).
- \*1034 MOLINA CIVIT (Juan), Ingénieur Civil, Directeur Général des Ponts et Chaussées, 670, Charcas, Buenos-Aires.
- \*1907 MOROSI ANGEL, Ingénieur Civil, 5, n° 582, La Plata.
- \*1548 RASSETTI (Luis), Ingénieur Civil, Canning, 3085, Buenos-Aires.
- \*1517 RESANO (Isidro), Ingénieur Civil, Alsina, 671, Buenos-Aires.
- \*1543 ROMERO (Rafael), Ingénieur Civil, San Fernando (F. C.-C. D.)

**Australie — Commonwealth of Australia**

- 1790 COANE (H. E.), Prett's Buildings, 70, Queen Street, Melbourne.
- \*1180 WILKINSON (O. S.), Shire Engineer, Quirindi (N. S. W.).

**Belgique — Belgium — Bélgica**

- 1427 ANTOINE, Fonctionnaire communal, Hôtel communal, Schaerbeek-lez-Bruxelles.
- \*1861 Aoust (P. D'), Secrétaire Général du Royal Automobile-Club de Belgique, 183, rue Frans-Merjay, Bruxelles.
- 1277 BATA (J.), Sous-Directeur des Travaux Publics, 82, rue Glacière, Seraing.
- 1426 BERTRAND, Ingénieur communal, Hôtel communal, Schaerbeek-lez-Bruxelles.
- 1278 BILLS (J.), Ingénieur de 1<sup>re</sup> Classe au Service de la Voirie de la Ville d'Anvers, 13, marché St-Jacques, Anvers.

MM. Messrs. Sres.

- \*1039 BLASER (J. P.), Ingénieur Civil E. P. Z., 72 A, rue du Marteau, Bruxelles.
- 1804 BRANCART (Arnould), Ingénieur, c/o Continental Petroleum Company, 55, avenue de France, Anvers.
- 1950 CARDON LESAFFRE (Pierre), Maître de Carrières, 207, route de Ghiolenghien, Lessines.
- 1565 CLAEYS (E.), Ingénieur Principal des Ponts et Chaussées, Les Rivages, Dinant.
- 1056 CONARD (J.-J.), Ingénieur en Chef Directeur des Ponts et Chaussées, Chargé de la Direction des Routes à l'Administration Centrale des Ponts et Chaussées, 48, rue du Magistrat, Ixelles-Bruxelles.
- 1054 CORIAT (Joachim), Directeur de la Société de Construction et de Location de Matériel de Voirie, 207, chaussée de Waterloo, Namur.
- 1937 DEBAEDTS (Charles), Ingénieur principal des Ponts et Chaussées, Turnhout.
- 1122 DECOSSAUX (Emile), Ingénieur en Chef Directeur des Ponts et Chaussées, 2, rue de Gaillardmont, Mons.
- 1181 DEMOLLIN (V.), Ingénieur, 16, avenue Messidor, Uccle-Bruxelles.
- 1165 DESPRETZ (R.-A.), Maître de Carrières, 1, rue de l'Hôtellerie, Lessines.
- 1259 DETHY (X.), Inspecteur Général, Directeur-Général honoraire des Ponts et Chaussées, 40, rue Pépin, Namur.
- 1461 DIRECTEUR (Monsieur le) de la Société des Carrières de Merbes-Sprimont, Sprimont-Liège.
- 1319 DUBOSCH (Ch.), Directeur technique du Haut-Commissariat royal de la Région Flandre Orientale et Anvers, 41, rue Juste-Lipse, Gand.
- 1372 FLAMAND (A.), v. Jordaens, 100, Anvers.
- 1425 FOUCART, Echevin des Travaux publics, Hôtel communal, Schaerbeek-lez-Bruxelles.
- 1282 FRERICHS (Ch.), Ingénieur, Membre de la Délégation belge à la Commission des Réparations, 21, rue Gachard, Bruxelles.

## MM. Messrs. Sres.

- 1109 FROIDURE (Eugène), Ingénieur Principal des Ponts et Chaussées, Poperinghe.
- 1258 GANSBERGHE (J. VAN), Directeur Général des Ponts et Chaussées en retraite, 47, avenue de la Cascade, Bruxelles.
- 1465 GATHY (Nicolas), Directeur-Gérant de la Société des Carrières de Grès de Poulseur, Poulseur.
- 1462 GEVAERT (Eugène), Directeur Général des Ponts et Chaussées, 207, rue de la Victoire, Bruxelles.
- 1312 GRENIER (L.), Haut-Commissaire Royal de Flandre Orientale et d'Anvers, Directeur Général honoraire des Ponts et Chaussées, 66, chaussée d'Audenarde, Gand.
- 1295 HALLET-HAXHE, Géomètre-Juré, Entrepreneur de Travaux Publics, Hornay-Sprimont (Prov. de Liège).
- 1290 HARIGA (Lucien), Ingénieur, 17, avenue du Progrès, Gosselies.
- \*1481 HECKE (A. VAN), Professeur à l'Université, 36, rue Dago-  
bert, Louvain.
- 1424 HEEM (Paul de), Ingénieur en Chef Directeur des Ponts et Chaussées, 26, rue Albert-Grisar, Anvers.
- 1328 HEYLBROECK (A.-J.), Ingénieur des Ponts et Chaussées, boulevard d'Akkergem, 48, Gand.
- 1208 Hofmans (Jules), Entrepreneur de Travaux Publics, 405, rue de Bruxelles, Lodelinsart (La Planche).
- \*1521 HOUBEN (Robert), Fabricant de Produits chimiques, 442, chaussée de Neerstalle, Uccle.
- 1200 HUMBLET (P.), Entrepreneur de Travaux Publics, 153-157, rue Mangombroux, Verviers.
- 1261 JANSSENS (Cyrille), Secrétaire du Haut-Commissariat du Littoral, 21, rue Wellington, Ostende.
- 1680 JOACHIM (Arthur), Entrepreneur de Travaux Publics, 68, rue d'Estrée, Marcinelle.
- 1164 LAMBIN (Albert), Ingénieur en Chef Directeur des Ponts et Chaussées, Secrétaire Général de l'A. I. P. des Congrès de Navigation, 181, avenue de Tervueren, Bruxelles.
- 1260 LEMAIRE (E.), Inspecteur Général des Ponts et Chaussées, 147, rue St-Henri, Woluwe-St-Lambert-lez-Bruxelles.

## MM. Messrs. Sres.

- 1234 LEMEUNIER (R.), Ingénieur en Chef, Directeur de la Voirie, 31, rue du Couvent, Anvers.
- 1284 LENOIR (J.), Administrateur-Délégué de la Société Anonyme des Carrières de Porphyre du Mouplon à Lessines.
- 1246 LOPPENS (Georges), Ingénieur du Service Technique de la Province, Liège.
- 1432 LUYSSSEN (Georges), Ingénieur des Ponts et Chaussées, 57, rue d'Oullremont, Bruxelles.
- 1411 MELOTTE (J.), Inspecteur Général des Ponts et Chaussées, 50, rue St-Quentin, Bruxelles.
- 1860 MEESTER DE BETZENBROECK (F. DE), Vice-Président du Royal Automobile-Club de Belgique, 96, rue de la Loi à Bruxelles.
- 1236 MEULEMANS (Franz), Industriel, 26, rue Edouard-Wacken, Liège.
- \*1240 MONNOYER (Léon), Entrepreneur de Travaux Publics, 1, rue Camille-Lemonnier, Bruxelles.
- 1241 MOTIÉ (Théo), Exploitant de Carrières, 36, square Gutenberg, Bruxelles.
- 1595 NOORBECK (Edouard VAN), Inspecteur Général de la Société Nationale des Chemins de fer Vicinaux, 14, rue de la Science, Bruxelles.
- 1736 NOTTÉ-LENOIR (Louis), Administrateur de la Société des Carrières Unies de Porphyre, 1, rue des Quatre-Bras, Bruxelles.
- 1477 NOTTÉ-ROUSSEL, Industriel, Carrières de Porphyre, 64, rue Tramasure, Lessines.
- 1201 QUESTIENNE (Philippe), Commissaire-Voyer, 99, rue de Félinne, Liège.
- 1242 QUÉVIT, Exploitant des Grandes Carrières de Rieudotte, place du Chapitre, Andenne.
- 1163 RICHALD (J.), Ingénieur en Chef Directeur des Ponts et Chaussées, Professeur à l'Université de Gand, 69, rue Archimède, Bruxelles.
- 1291 ROSÉE (Baron Alfred de), Consul de Bolivie, Vice-Président du Comité de Tourisme du Royal-Automobile-Club de Belgique, Château de Schaltin (Hamois-Condroz), Province de Namur.

## MM. Messrs. Sres.

- 1724 SANTILMAN (Hubert), Ingénieur des Ponts et Chaussées, 14, avenue de la Reine, Ostende.
- 1052 SCHUEREN (P. J. VAN DER), Inspecteur Général des Ponts et Chaussées, 88, avenue Victor Jacobs, Etterbeek-Bruxelles.
- 1475 SCENEN (A.), Ingénieur de la Ville de Gand, 9, boulevard Frère-Orban, Gand.
- 1245 SCÈTE (Jules), Conducteur des Ponts et Chaussées, 141, rue d'Ouest, Blankenberghe.
- 1179 SOIVAY (Louis), Ingénieur-Industriel, 23, avenue des Arts, Bruxelles.
- 1283 TACQUENIER (Philippe), 4, place de la Comédie, Moll.
- 1104 VOLSOM (E. VAN), Ingénieur en Chef Directeur des Ponts et Chaussées, 87, rue des Aduatiques, Bruxelles.
- 1060 WALIN (E.), Directeur Général honoraire des Ponts et Chaussées, 56, rue des Eburons, Bruxelles.
- \*1175 WETTER (L. VAN), Ingénieur Principal des Ponts et Chaussées, 30, avenue Rogier, Liège.
- 1433 WIELEMANS-CEUPPENS, Brasseur, 366, avenue Van Volxem, Bruxelles.

## Brésil — Brazil — Brasil

- \*1405 ANDRADE RUMD (DE) (Mario), Ingénieur, Professeur d'électrotechnique, Voluntarios da Patria, 389, Rio-de-Janeiro.
- 1470 CAMPOS (DE) (M. B.), Ingénieur Civil, Avenida Acclimação, 95, Sao-Paulo.
- 1928 COSTA FERREIRA (João DA), Sous-Directeur des Voies publiques, Prefeitura Municipal, Rua D. Anna 62, Rio-de-Janeiro.
- \*1028 LAMARE (DE) (Colonel Joaquim), Engenheiro Civil, Caixa, 998, Rio-de-Janeiro.
- \*1224 MORAES JUNIOR (Luiz), Ingénieur Civil. Consul Général de la République d'Haïti, 43, rue Ourives. Rio-de-Janeiro.

## MM. Messrs. Sres.

- \*1030 NUNES RIBEIRO, Engenheiro Chef da Fiscalidad do Porto Paranogua, Inspectoria Federal de Portos, Rios et Canaes, Rua Marquez de Abrantes, nº 60, Rio-de-Janeiro.
- 1838 OLAVO FREIRE J<sup>re</sup>, Directeur des Travaux Publics de l'Etat de Santa Catharina, Caixa Postal 24, Florianopolis.
- 1472 PEREIRA LEITAO (C. A.), Ingénieur Civil, Rua Frei Caneca, 24 B, Sao-Paulo.
- \*1144 PEREIRA DA SILVA (Dr. C.), Ingénieur Civil, Professeur à l'Ecole Polytechnique de St-Paul, Directeur du chemin Nord-Ouest du Brésil, rua do Bispo 227, Rio-de-Janeiro.
- 1471 PEREIRA E SOUZA (T. O.), Ingénieur Civil, Avenida Acclimação 87, Sao-Paulo.
- \*1021 SILVA FREIRE (V. DA), Directeur des Travaux Publics, Caixa Postal 18, Sao-Paulo.
- \*1924 WEINCENCK (Oscar), Ingénieur Civil, Ex-Maire de la Ville de Pétropolis, rua dos Voluntarios da Patria, 204, Rio-de-Janeiro.

## Canada

- 1356 ALLEN (Lucius E.), President Ontario Good Roads Association, Canadian Bank of Commerce Building, Ontario.
- \*1137 CAMPBELL (Archibald W.), Highway Commissioner, Department of Railways and Canals, Ottawa.
- 1832 MACNAUGHTON (M. F.), Chemical Engineer and Graduate Student in Highway Engineering, University of Michigan, 26, Burton Avenue, Westmount, Province of Québec.

## Chili — Chile

- \*1153 DOLL (Enrique R.), Ingénieur Civil, ancien Directeur Général au Ministère des Travaux Publics, Casilla, 724, Santiago.
- 1789 LÉON (Firmin), Ingeniero, Casilla, 615, Valparaiso.
- \*1032 VICENTE (Edwards S.), Ingeniero Civil, Casilla 234, Valparaiso.
- 1788 VIGIL (Hector), Abogado, Casilla, 615, Valparaiso.

**Chine — China**

MM. Messrs. Sres.

- \*1013 CHOLLOT (J. J.), Ingénieur des Ponts et Chaussées, 476, rue Eugène-Bard, Shanghai.
- \*1814 GEE (G. T.), Graduate Student in Highway Engineering, University of Michigan, 36, Nyien Kwan Yang, Hangchow, Chekiang.
- \*1899 SHING YI TANG, 39, Tung-folk, St-Honan, Canton.
- \*1714 TSANG OU, *Représentant du Ministère des Communications de la République Chinoise*, 5, rue de Mogador, Paris (9°).

**Cuba**

- 1939 COROALLES (Manuel A.), Ingeniero Jefe de Obras públicas, La Havane.

**Danemark — Denmark — Dinamarca**

- 1713 CHRISTENSEN (A. R.), Professeur à l'Ecole Polytechnique Conseiller Municipal de Copenhague, Puggaardsgade, 13, Copenhague.
- 1841 DALBERG (Ascel V. S.), Amtsvejinspektør M. I. F., Viborg.
- 1317 LOMHOLT (Kaptain J. P.), Amtsvejinspektør, Road Surveyor, Odense.
- 1881 MORTENSEN (H. P.), Ingénieur Municipal, Roskilde.
- 1745 NOHR (Laurit Vilhelm), Ingénieur, 6, Bjerregaardsvej, Copenhague.
- 1110 OLSEN (Constantin), Ingénieur-Entrepreneur, 14, Gartnergade, Copenhague N.
- 1880 WESTERGAARD (W. A.), Ingénieur Municipal, Manzinsvej, 40, Hellerup.

**Egypte — Egypt — Egipto**

- \*1019 GROSJEAN (Georges), Ingénieur à la Compagnie d'Héliopolis, Héliopolis.
- \*1915 WASSEF (K. Zaki), Ingénieur des Ponts et Chaussées, 11, rue Boulros, Héliopolis.



## , Espagne — Spain — España

MM. Messrs. Sres.

- 1754 ALBACETE (Francisco de), Ingeniero Jefe de Obras Públicas, Fernando el Santo, 20, Madrid.
- 1141 ALLENDE (Victor O. de), Director de Obras y Caminos provinciales de Vizcaya, Bilbao-Diputación.
- \*1898 ARANGO SOMOZA (Luis F.), Ingeniero de Caminos, Canales y Puertos, Espolon 40, Burgos.
- 1570 BARON (Alphonse), Ingeniero de Caminos, Canales y Puertos, Sevilla.
- 1890 CASADO Y ROJAS (J.), Ingeniero de Caminos, Canales y Puertos, Lugo.
- 1569 CONRADI (Juan B.), Ingeniero de Caminos, Canales y Puertos, Sevilla.
- \*1568 DORÉSTE (F. Ramirez), Ingeniero Jefe de Obras Públicas, Sevilla.
- \*1897 FESSER Y FERNANDEZ (Carlo), Ingeniero de Caminos, Canales y Puertos, 21, Avenida de la Isla, Burgos.
- 1734 GARCIA DE SOLA (Francisco), Ingeniero de Caminos, Canales y Puertos, Sacramento, 57, Cadix.
- \*1876 GRAÍÑO Y OBANO (José), Ingeniero de Caminos, Canales y Puertos, Aviles, Oviedo.
- \*1882 HERNANDEZ CORRAL (Mariano), Ingeniero de Caminos, Jefatura de Obras públicas, Lugo.
- 1572 IBARRA Y MIRÓ (Antonio), Ingeniero de Caminos, Canales y Puertos, Sevilla.
- \*1723 MARTIN JIMENEZ (J. L.), Ingeniero de Caminos, Canales y Puertos, Garcia Barrado, 37, Salamanca.
- 1905 MARTINEZ Y RUIZ DE AZUA (T.), Ingeniero Jefe de Caminos, Canales y Puertos, Zaragoza 7, Cadiz.
- \*1722 MORALES LAHUERTA (P.), Ingeniero de Caminos, Canales y Puertos, Sorni 20. 1º, Valencia.
- \*1718 OLIVER Y ROMAN (B.), Ingeniero Jefe de Caminos, Canales y Puertos, Calle del Braense, 2, dupº, Salamanca.
- 1066 PAGOLA Y GOYA (R.), Director de Caminos Provinciales, Diputación, San Sebastien (Guipuzcoa).

## MM. Messrs. Sres.

- \*1749 PALOMO (Duran J.), Ingeniero de Caminos, Canales y Puertos, General Zurbano n° 9, 3°, Logrono.
- \*1927 PARDO (don Manuel Lorenzo), Ingeniero de Caminos, División Hidraulica del Ebro, Plaza de la Constitución, 3, Zaragoza.
- 1571 PARIAS (Jose), Ingeniero de Caminos, Canales y Puertos. Sevilla.
- \*1916 RAMIS LLOMPART (Miguel), Ingeniero de Caminos, Canales y Puertos, Rambla de Aragón D. Lérida.
- \*1006 RODRIGUEZ SPITERI (José), Ingeniero Jefe de Caminos, Canales y Puertos, Jefe de Obras Publicas, Malaga.
- 1805 SORIANO Y ESCUDERO (Angel), Ingeniero de Caminos, Ingeniero Jefe de la Deputación Provincial, Amador de los Rios, 5, Madrid.
- 1309 STEVA Y PLANAS (F.), Ingeniero al Servicio del Ayuntamiento de Barcelona, Salmerón, 229, Entº, Barcelona.
- 1884 TORRE Y EGUIA (Manuel de la), Ingeniero Jefe de Caminos de Gov. espagnol, Valenzuela n° 10, Madrid.
- 1067 VILELLA (Manuel), Ingeniero Jefe de Caminos, Canales y Puertos, 4, San Ignacio, Pamplona.
- 1902 ZARDÓYA MORERA (Jaime), Ingeniero, Calle de Provenza 247, 1º, 1ª Barcelona.

## Etats-Unis — United States — Estados Unidos

- 1469 ABRAMS (Duff A.), Professor in charge, Structural Materials Research Laboratory, Lewis Institute, Chicago (Ill.).
- 1613 ADLER (Julius), Deputy Chief, Bureau of Highways, Room 232, City Hall, Philadelphia, Pa.
- 1664 AGG (Thomas Radford), Professor of Highway Engineering, Iowa State College, Ames (Iowa).
- 1690 ALLEN (Henry C.), Consulting Civil Engineer, 202, Syracuse Savings Bank Building, Syracuse (N. Y.).
- \*1614 BARBER (Iwan W.), Graduate Student in Highway Eng'g, 302, Mesquite Street, Arlington, Texas.
- 1825 BARTHOLOMEW (W. H.), Manager, Foreign Sales Department, Koshring Company, Room, 1370. 50, Church Street, New York.

## MM. Messrs. Sres.

- 1579 BEMENT (A. F.), Vice-President and Secretary, The Lincoln Association, Detroit, Michigan.
- \*1615 BERNARD (Merrill), Civil Engineer in charge of Highway Construction, Crowley, Louisiana.
- 1650 BIBBINS (Rowland J.), Manager, Department of Transportation and Communication, Chamber of Commerce of the U. S. A., Mills Building, Washington, D. C.
- \*1016 BIXBY (Brig. Gen. W. M. II.), U. S. Army retired, 1709, Lanier Place N. W., Washington D. C.
- \*1912 BLAIR (W. P.), Vice-Président and Consulting Engineer, « National paving Brick Manufacturers Association » 830, Engineers Building, Cleveland (Ohio).
- \*1415 BLANCHARD (A. H.), Librarian, Davis Library of Highway Engineering and Highway Transport, University of Michigan, Ann Arbor, Mich.
- \*1149 BLANCHARD (A. H.), Professor of Highway Engineering and Highway Transport, M. Am. Soc. C. E., University of Michigan, Engineering Building, Ann Arbor, Mich.
- 1726 BLOSSER (E. C.), State Highway Engineer of Ohio, Columbus (Ohio).
- \*1580 BOWLBY (Lieut. Col. H. L.), Senior Highway Engineer, U. S. Bureau of Public Roads, Washington D. C.
- \*1918 BRADBURY (W. F.), Représentant, pour l'Amérique du Sud, de Warren Brothers C<sup>r</sup> Boston « pavage Warranite Bikilithic », 9, Cambridge Str., Boston (Mass.).
- 1821 BRAGONIER (A. T.), Detroit Edison Fellow in Highway Engineering University of Michigan, Sheperstown, West Virginia.
- 1665 BREED (Ch. B.), M. Am. Soc. C. E., Professor of Railway and Highway Engineering, Massachusetts Institute of Technology, Cambridge (Mass.).
- \*1741 BREVIK (Berry Edmund), Highway and Civil Engineer, c/o University of Minnesota Room 123, Engineering Building, Minneapolis (Minn.).
- \*1651 BRILL (James B.), Graduate Student in High. Eng'g 608, North New Jersey Street, Indianapolis (Ind.).

## MM. Messrs. Sres.

- 1818 BROWN (Charles Wilson), Graduate Student in Highway Engineering, University of Michigan, 291, North Main Street, Gloversville, New York.
- 1819 BUCHOLTZ (Steve), Graduate Student in Highway Engineering, University of Michigan, 275, Heighth Street, Manislee, Michigan.
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- 1084 FRANÇOIS (Charles), Docteur en Droit, Secrétaire Général de la Compagnie du Gaz de Lyon, 3, quai des Célestins, Lyon (Rhône).

MM. Messrs. Sres.

- 1249 FROMENT (L.-P.), Directeur du Journal « l'Entreprise », 9, rue Fénelon, Paris (IX<sup>e</sup>).
- \*1183 FRONTARD (Jean), Ingénieur en Chef des Ponts et Chaussées, Bar-le-Duc (Meuse).
- 1336 GABIAT (Camille), Conseiller Général, Maire de St-Sulpice-les-Feuilles (Haute-Vienne).
- 1171 GABIAT (Madame Veuve), 23, boulevard Saint-Michel, Etampes (Seine-et-Oise).
- 1395 GAJAN (C.-B.), Ingénieur des Ponts et Chaussées, 11, Place Carnot, Carcassonne (Aude).
- 1739 GASSIER (Maurice), Ingénieur en Chef des Ponts et Chaussées, 25, rue de Courcelles, Paris (VIII<sup>e</sup>).
- 1045 GAUDRAY (Auguste), Agent Voyer Principal, 121, rue de la République, Caudebec-les-Elbeuf (Seine-Inférieure).
- \*1035 GENET (Paul-G.), Ingénieur en Chef des Ponts et Chaussées, Quimper (Finistère).
- \*1032 GENISSIEU, Ingénieur des Ponts et Chaussées, 31, rue Wilson, Colmar (Haut-Rhin).
- \*1439 GERDÈS (Pierre), Ingénieur en Chef des Ponts et Chaussées, 3, place de la Préfecture, Saint-Brieuc (Côtes-du-Nord).
- 1118 GÉRIN (Victor), Agent Voyer en Chef, Président honoraire de la Société Centrale des Agents Voyers de France, Préfecture de Marseille (Bouches-du-Rhône).
- 1383 GEX (Raymond), Ingénieur des Ponts et Chaussées, 20, rue J.-P.-Veyral, Chambéry (Savoie).
- 1715 GIRARD (Edmond), Ingénieur en Chef des Ponts et Chaussées, 10, rue du Palais, Montpellier (Hérault).
- 1380 GIRARD-COL, Industriel, 2, place Fontgièvre, Clermont-Ferrand (Puy-de-Dôme).
- 1206 GIRAUD (II.), Inspecteur Général des Travaux de Paris, 20, rue Chevert, Paris (VII<sup>e</sup>).
- 1121 GIROD (Paul), Ingénieur, Directeur Général de la C<sup>ie</sup> des Forges et Acéries électriques Paul-Girod, Ugine (Savoie).
- 1609 GOURRET, Ingénieur des Ponts et Chaussées, Marseille (Bouches-du-Rhône).

## MM. Messrs. Sres.

- 1357 GRAMAIN, Ingénieur des Ponts et Chaussées, 14, avenue de Fontainebleau, Melun (Seine-et-Marne).
- 1455 GRANDURY, Entrepreneur de Travaux Publics, 5, rue du Helder, Paris (IX<sup>e</sup>).
- 1108 GRELARD (Gustave), Agent Voyer Cantonal, Les Herbiers (Vendée).
- 1466 GROSSE (Léon), Entrepreneur de Travaux Publics, Aix-les-Bains (Savoie).
- 1637 GUBIAND (Georges), Inspecteur Général des Ponts et Chaussées, 51, rue de Paris, Meudon (S.-et-O.).
- 1647 GUELLE (Maxence), Ingénieur des Ponts et Chaussées, Montbéliard (Doubs).
- 1223 GUÉRIN (Tony), Conseiller Prud'homme de la Seine, Négociant-Commissionnaire, 5, rue des Messageries, Paris.
- 1333 GUIET (S.), Agent Voyer en Chef, La Roche-sur-Yon (Vendée).
- 1854 GUILLET (Camille), Ingénieur en Chef des Ponts et Chaussées, Versailles (S.-et-O.).
- 1413 GUYON-GELLIN (F.), Ingénieur des Ponts et Chaussées, 17, rue Hébert, Grenoble (Isère).
- 1061 GUYOT (J.), Ingénieur en Chef des Ponts et Chaussées, 38, rue du Château, Dijon (Côte-d'Or).
- 1682 HAEGELEN (Alfred), Ingénieur des Ponts et Chaussées, Directeur des Ports de Strasbourg et de Kehl, Strasbourg.
- 1172 HEGLY (V.), Ingénieur en Chef des Ponts et Chaussées, 11, place Carnot, Charleville (Ardennes).
- 1644 HENNEQUIN (J.), Ingénieur en Chef des Ponts et Chaussées, 77, boulevard Gergovia, Clermont-Ferrand (Puy-de-Dôme).
- \*1513 HERMANN (le Dr), Ingénieur en Chef des Ponts et Chaussées, 4, allée de la Meute, Le Vésinet (Seine-et-Oise).
- 1516 HOUBRON (A.), Chef de Comptabilité à la Banque de France, 6, rue des Vallons, Paris.
- 1705 HOULLIER (Paul), Ingénieur des Ponts et Chaussées, 19, rue Millevoye, Abbeville (Somme).

MM. Messrs. Sres.

- \*1636 HOUBEURT, Ingénieur en Chef des Ponts et Chaussées, 7, rue Lesdiguières, Grenoble (Isère).
- 1438 HUGUES (U.), Ingénieur en Chef des Ponts et Chaussées, 8, boulevard St-Michel, Avignon (Vaucluse).
- \*1523 HUMBERT, Agent Voyer en Chef du Rhône, Membre de la Commission Internationale Permanente des Congrès de la Route, Préfecture de Lyon (Rhône).
- 1631 JOMIER (Gaston), Ingénieur en Chef des Ponts et Chaussées, Niort (Deux-Sèvres).
- 1250 JOURDE (Raoul), Ingénieur des Ponts et Chaussées, 94, avenue Kléber, Paris (XVI<sup>e</sup>).
- \*1196 JOYANT (Edouard), Ingénieur en Chef des Ponts et Chaussées, 159, avenue de Wagram, Paris (XVII<sup>e</sup>).
- 1125 KAUFFMANN (Albert), Inspecteur Général des Ponts et Chaussées, 246, boulevard Saint-Germain, Paris.
- 1936 KROMM (H. M.), Agent Voyer d'Arrondissement, Lesparre, (Gironde).
- 1473 LABADIE (Léonce), Ingénieur des Ponts et Chaussées, 161, rue Grande, Fontainebleau (Seine-et-Marne).
- \*1382 LACAU (Robert), Ingénieur Conseil Expert, 6, rue de Vienne, Paris.
- 1469 LACOMME (A.), Agent Voyer cantonal, Domart-en-Ponthieu (Somme).
- \*1020 LAFFLY (A.), Industriel, Ingénieur-Constructeur, 82, rue du Vieux-Pont-de-Sèvres, Billancourt (Seine).
- 1753 LAHAYE (R.), Ingénieur des Ponts et Chaussées, Charleville, (Ardennes).
- 1213 LANGLET (Félix), Directeur, en retraite, de la Voirie municipale de Reims, 26, rue Simon, Reims (Marne).
- 1430 LANTENOIS (Charles), Ingénieur des Ponts et Chaussées, 3 bis, rue St-Lazare, Compiègne (Oise).
- 1264 LANTZ (le Commandant E.), Chef de Bataillon d'Infanterie, en congé, 67, boulevard Lannes, Paris (XVI<sup>e</sup>).
- 1648 LARROQUE (J.-M.), Ingénieur des Ponts et Chaussées, 22, boulevard Matabiau, Toulouse (Haute-Garonne).

## MM. Messrs. Sres.

- 1247 LASSAILLY (Jules), Distillateur de goudrons et Entrepreneur de goudronnage de routes, 47, rue Camille-Desmoulins, Issy-les-Moulineaux (Seine).
- 1170 LAUNAY (Georges), Ingénieur des Travaux Publics de l'Etat, 18, rue de Bagneux, Fontenay-aux-Roses (Seine).
- \*1251 LECLERC DE PULLIGNY (J.), Inspecteur Général des Ponts et Chaussées, en retraite, à Tain (Drôme).
- 1123 LE CORNEC (F.), Inspecteur Général des Ponts et Chaussées, 11, rue Michel-Ange, Paris (XVI<sup>e</sup>).
- \*1255 LEBEVRE-ALBARET (G.), Administrateur-Directeur Général de la Société anonyme des Anciens Etablissements Albaret, Rantigny (Oise).
- \*1355 LERORT, Ingénieur en Chef des Ponts et Chaussées, 2, rue J.-J.-Bel, à Bordeaux.
- \*1015 LE GAVRIAN (Paul), Ingénieur en Chef des Ponts et Chaussées, Professeur à l'Ecole Nationale des Ponts et Chaussées, Secrétaire Général de l'Association Internationale Permanente des Congrès de la Route, 1, avenue d'Iéna, Paris.
- 1377 LEGO (Léon), Constructeur-mécanicien, 5, rue des Vignes, Le Mans (Sarthe).
- 1610 LE GRAIN, Inspecteur Général des Ponts et Chaussées, Directeur de l'Ecole Nationale des Ponts et Chaussées, 28, rue des Saints-Pères, Paris (VII<sup>e</sup>).
- 1688 LEHANNÉUR (Louis), Ingénieur des Ponts et Chaussées, 4, rue de l'Académie, Caen (Calvados).
- 1014 LELIÈVRE (F.-C.), Agent Voyer d'Arrondissement, faisant fonctions d'Ingénieur ordinaire, rue du Chevalier-de-la-Barre, Bruay-sur-l'Escaut (Nord).
- 1017 LELIÈVRE (Charles), Agent Voyer d'Arrondissement honoraire, Professeur à l'Ecole Spéciale des Travaux Publics, 22, rue de la Chancellerie, Versailles (Seine-et-Oise).
- 1134 LEMOINE (A.), Inspecteur Général des Ponts et Chaussées, 5, rue Vavin, Paris.
- 1293 LEROUX (N.-C.-L.), Ingénieur en Chef des Ponts et Chaussées, 24, rue de Varenne, Paris (VII<sup>e</sup>).
- 1885 LEROY (P.-M.), Négociant, 5, route de la Révolte à Saint-Denis (Seine).

## MM. Messrs. Sres.

- 1732 LESBRE (André), Ingénieur des Ponts et Chaussées, Tulle (Corrèze).
- 1858 LESSARD (E.-J.), Ingénieur, Ancien élève de l'Ecole Polytechnique, 30, rue Diderot à Asnières (Seine).
- 1474 LEVÊQUE (François), Ingénieur en Chef des Ponts et Chaussées, Agent Voyer en Chef du Département. Préfecture, Chambéry (Savoie).
- 1398 LEVESQUE (Emile), Inspecteur Général des Ponts et Chaussées, Contrôleur Général au Ministère des Régions libérées, 4, place des Vosges, Paris (IV<sup>e</sup>).
- 1394 LÉVY (Pierre), Ingénieur en Chef des Ponts et Chaussées, 14, rue de Condé, Paris (XVI<sup>e</sup>).
- 1573 LINDECKER (Albert), Administrateur de la Société an<sup>me</sup> des Autobus Chaumontais, Chaumont (Haute-Marne).
- 1901 LINGUIN (R.), Docteur en droit, Avocat, Villa Christiane, Jardin Public, Biarritz.
- 1205 LIPMANN (L.), Ingénieur en Chef des Ponts et Chaussées, 4, rue Léon-Cesnard, Paris (VII<sup>e</sup>).
- \*1206 LÖEWY (André), Ingénieur en Chef des Ponts et Chaussées, 133, boulevard du Montparnasse, Paris (VI<sup>e</sup>).
- \*1005 LOIRE (G.), Administrateur Délégué, Directeur de la Société de Pavage et des Asphaltes de Paris, 61, quai de Javel, Paris (XV<sup>e</sup>).
- 1339 LOMBARD (M.), Ingénieur en Chef des Ponts et Chaussées, La Rochelle (Charente-Inférieure).
- 1514 LONGUETEAU (H.), Ingénieur des Travaux Publics de l'Etat, en retraite, 6, rue Vineuse, Paris (XVI<sup>e</sup>).
- \*1008 LORIEUX (E.), Inspecteur Général des Ponts et Chaussées, Directeur du Personnel, de la Comptabilité et de la Voirie routière au Ministère des Travaux Publics, 67, rue de Courcelles, Paris (VIII<sup>e</sup>).
- 1908 LUDINART (L.), Ingénieur en Chef, 7, place Carnot, Charleville (Ardennes).
- 1384 MAGNIER (Georges), Ingénieur en Chef des Ponts et Chaussées, 6, rue Péru-Lorel, Amiens (Somme).
- 1422 MAHÉ (Jean), Ingénieur des Ponts et Chaussées, 30, rue Philibert-Guide, Chalon-sur-Saône (Saône-et-Loire).

## MM. Messrs. Sres.

- \*1001 MAHIEU (Albert), Sénateur, Inspecteur Général des Ponts et Chaussées, Ancien Secrétaire Général du Ministère des Travaux Publics, Président de l'Association Internationale Permanente des Congrès de la Route, 14, avenue du Colonel-Bonnet, Paris (XVI<sup>e</sup>).
- 1111 MAILLARD, Agent Voyer en Chef, Service Vicinal, Préfecture de la Sarthe, Le Mans (Sarthe).
- 1114 MALAVAL (Ch.). Aux bons soins de M. Combet, Caisse d'Epargne, Uzès (Gard).
- 1490 MALÉGARIE (Charles), Ingénieur en Chef des Travaux publics, 26, rue de Turin, Paris.
- 1556 MANGE (François), Ingénieur Civil, 41, boulevard Magenta, Paris (X<sup>e</sup>).
- 1101 MARCHAND (A.), Directeur du Service de la Voirie et des Eaux de la Ville de Grenoble, passage de l'Hôtel-de-Ville, Grenoble (Isère).
- 1276 MARGUERY (E.), Ingénieur en Chef des Ponts et Chaussées, en retraite, 18, rue des Allées, Vesoul (H.-Saône).
- 1248 MARLIO (Louis), Ingénieur en Chef des Ponts et Chaussées, Maître des Requêtes honoraire au Conseil d'Etat, 16, avenue Bugeaud, Paris (XVI<sup>e</sup>).
- \*1436 MARTIN (Paul), Ingénieur des Ponts et Chaussées, 11, place Carnot, Charleville (Ardennes).
- 1446 MARTINOT (Eugène), Ingénieur des Ponts et Chaussées, 8, rue d'Isly, Verdun (Meuse).
- 1073 MATHEI (Charles), Directeur de la Fonderie de Saulnières, Saulnières, par Tréon (Eure-et-Loir).
- 1612 MATHEU, Ingénieur en Chef des Ponts et Chaussées, 1, place Garibaldi, Auch (Gers).
- 1646 MATHIEU (Ernest), Ingénieur en Chef des Ponts et Chaussées, Alençon (Orne).
- 1376 MATHIEU (Félicien), Ingénieur en Chef des Ponts et Chaussées, 2 bis, rue de la République, Perpignan (Pyr.-Or.).
- 1640 MAUDET (A.), Ingénieur des Ponts et Chaussées, 18 bis rue Berthelot, Le Mans (Sarthe).
- \*1023 MAYER (Eugène), Ingénieur en Chef des Ponts et Chaussées, 44, rue du Renard, Paris (IV<sup>e</sup>).

## MM. Messrs. Sres.

- 1397 MERLE (Paul), Ingénieur en Chef des Ponts et Chaussées, Mende (Lozère).
- \*1002 MESNAGER (P.), Inspecteur Général des Ponts et Chaussées, 182, rue de Rivoli, Paris (1<sup>er</sup>).
- \*1193 METZ (Arthur), Ingénieur Civil, Ancien Membre de la Chambre de Commerce de Paris, Conseiller du Commerce extérieur de la France, 154, boulevard Magenta, Paris (X<sup>e</sup>).
- 1226 MIALAUD (Georges), Société des Carrières de la Meilleraie, à Pouzanges (Vendée).
- 1168 MICHAUX (Paul-Emile), Agent Voyer en Chef honoraire, Membre du Comité Consultatif de la Vicinalité au Ministère de l'Intérieur, 1 bis, rue de Provence, Versailles (Seine-et-Oise).
- 1270 MIELLE (Henri), Ingénieur en Chef des Ponts et Chaussées, 27, rue Voltaire, Bourg (Ain).
- 1893 MILLAUD (R.), Secrétaire de la Commission des Travaux publics à la Chambre des Députés, 1, rue Boutarel (Ile-St-Louis), Paris.
- 1076 MOISSENET (L.), Ingénieur en Chef des Ponts et Chaussées, en retraite, Villa Odette, rue Tuc-d'Eauze, Dax (Landes).
- 1043 MONET (Adolphe), Inspecteur Général des Ponts et Chaussées, 16, avenue d'Orléans, Paris (XIV<sup>e</sup>).
- \*1450 MONIN (Madame Veuve), Entreprise de Travaux Publics, 7, rue Pelletier, Villeurbanne (Rhône).
- 1519 MONSARRAT (G.), Sous-Directeur au Ministère de l'Intérieur, 95, avenue Mozart, Paris (XVI<sup>e</sup>).
- 1221 MOREAU (P.), Ingénieur en Chef des Ponts et Chaussées, Lons-le-Saulnier (Jura).
- 1588 NABOULET (G.), Ingénieur des Ponts et Chaussées, Villeneuve-sur-Lot (Lot-et-Garonne).
- \*1390 NATANSON (T.), Administrateur de la Société « Solidilit Français », 12, rue du Plat, Lyon (Rhône).
- 1160 NEVEUX (Gustave), Ingénieur des Travaux Publics de l'Etat, Directeur des Services de la Voirie, Hôtel-de-Ville, Roubaix (Nord).
- \*1410 NICOLAS, Ingénieur en Chef des Ponts et Chaussées, 40, avenue Gallieni, Villemomble (Seine).



## MM. Messrs. Sres.

- 1050 NORY (Léon), Agent Commercial du Syndicat des Carrières de Porphyre, à Lessines, 50, rue Nicolas-Leblanc, Lille (Nord).
- 1463 ORNELLAS (Charles d'), Ingénieur des Arts et Manufactures, 11, rue Louis-le-Grand, Paris (II<sup>e</sup>).
- 1374 OURSON (H.), Ingénieur en Chef des Ponts et Chaussées, Professeur à l'Ecole Nationale des Ponts et Chaussées, 4, place du Président-Mithouard, Paris (VII<sup>e</sup>).
- 1253 PARENT (J.-H.), Ingénieur en Chef des Ponts et Chaussées, 7, rue du Grenier-à-Sel, Beauvais (Oise).
- 1627 PARISSET (E.), Ingénieur en Chef des Ponts et Chaussées, 10, rue de l'Esplanade, Metz (Moselle).
- 1388 PARMENTIER (Jean), Ingénieur en Chef des Ponts et Chaussées, 20, rue Dumont-d'Urville, Paris (XVI<sup>e</sup>).
- 1238 PENDARIES (A.), Ingénieur en Chef des Ponts et Chaussées du Département de la Haute-Garonne, 4, rue de la Madeleine, Toulouse (Haute-Garonne).
- 1467 PERRET (Jules), Ingénieur en Chef des Ponts et Chaussées, 14, avenue de Paris, Tulle (Corrèze).
- \*1393 PETAVY (Jean), Administrateur-Directeur de la Société anonyme des Pneumatiques Dunlop, 57, rue des Bâtignolles, Paris (VIII<sup>e</sup>).
- 1502 PETIT (Léon), Ingénieur des Ponts et Chaussées, 1, rue des Clefs, Colmar (Haut-Rhin).
- 1090 PICAROUGNE (J.-R.), Inspecteur Général Honoraire des Ponts et Chaussées, La Margide, par Laroquebrou (Cantal).
- 1506 PIERRET (L.), Inspecteur Général des Ponts et Chaussées, 5, place Malesherbes, Paris (XVII<sup>e</sup>).
- 1444 PIGLET (E.), Ingénieur des Ponts et Chaussées, St-Paul-sur-Ternoise (Pas-de-Calais).
- 1515 PLANTARD (Julien), Ingénieur des Ponts et Chaussées, 53, rue de Douai, Arras (Pas-de-Calais).
- 1096 POISSON (G.-E.), Inspecteur Général des Ponts et Chaussées, 211, avenue de Neuilly, Neuilly-sur-Seine, (Seine).
- 1851 POMMIER (Edouard), Ingénieur des Travaux Publics de l'Etat, 6, rue d'Estrées. Paris (VII<sup>e</sup>).

## MM. Messrs. Sres.

- 1420 PROMPSAL, Ingénieur des Ponts et Chaussées, à Vierzon (Cher).
- 1416 RABY (E.-J.), Ingénieur des Ponts et Chaussées, 12, rue de la Chaîne, Montreuil-sur-Mer (Pas-de-Calais).
- 1257 RADET, Ingénieur en Chef des Ponts et Chaussées, route de Courville, Guéret (Creuse).
- 1204 RASQUIN (Édouard), Entrepreneur de Travaux Publics et Maître de Carrières, 70, avenue de Ferrière, Rousies (Nord).
- \*1302 REBUFFEL (Charles), Président du Conseil d'Administration de la Société des Grands Travaux de Marseille, 25, rue de Courcelles, Paris (VIII<sup>e</sup>).
- 1630 REZEAU, Ingénieur en Chef des Ponts et Chaussées, Evreux (Eure).
- 1280 RHEIMS (E.), Industriel, 131, avenue Malakoff, Paris (XVI<sup>e</sup>).
- 1353 RICHARD (Georges), Fondé de pouvoirs des Carrières de St-Chéron, 12, rue Margueritte, Paris (XVII<sup>e</sup>).
- 1633 ROQUES (Louis), Ingénieur des Ponts et Chaussées, Marmande (Lot-et-Garonne).
- 1069 ROUSSEAU (Paul), Rédacteur au « Temps », 14, rue du Helder, Paris (IX<sup>e</sup>).
- \*1500 ROUVILLE (A. de), Ingénieur en Chef des Ponts et Chaussées, Ingénieur en Chef du Service Central des Phares et Balises, 43, avenue du Président-Wilson, Paris (XVI<sup>e</sup>).
- \*1505 SAIGNAT (A.), Entrepreneur de Travaux Publics, 68, rue Molière, Ivry-sur-Seine (Seine).
- 1202 SAUNIER (Honoré), Agent Voyer d'Arrondissement Principal, 2, rue Casimir-Périer, Le Havre (Seine-Inférieure).
- 1468 SCHWARTZ (Maurice), Ingénieur des Ponts et Chaussées, 16, Grand-Chemin de Toulon, Marseille (Bouches-du-Rhône).
- 1074 SÉNÉCHAL (J.), Agent Voyer d'Arrondissement, 29, rue de St-Quentin, Malo-les-Bains (Nord).
- 1273 SENTENAC (François), Ingénieur en Chef des Ponts et Chaussées, 9, boulevard de Port-Royal, Paris (XIII<sup>e</sup>).

## MM. Messrs. Sres.

- 1345 SENTILHES (T.), Inspecteur Général des Ponts et Chaussées, 20, rue Taylor, Pau (Basses-Pyrénées).
- 1262 SERISÉ (Paul), Agent Voyer en Chef des Landes, Mont-de-Marsan (Landes).
- 1284 SERRIN (H.), Membre de la Société des Ingénieurs Civils Electriciens et des « Electrical Engineers », 20, rue St-Vincent-de-Paul à Paris (10°).
- 1414 SIMON (Pierre-Noël), Ingénieur en Chef des Ponts et Chaussées, 31, rue Pérolière, Gap (Hautes-Alpes).
- \*1524 SOLEIL (G.), Ingénieur des Ponts et Chaussées, 91, rue Chasselièvre, Rouen (Seine-Inférieure).
- 1391 SOLIDITIT FRANÇAIS (M. le Directeur du), 12, rue du Plat, Lyon (Rhône).
- 1275 STOCLET (A.), Inspecteur Général des Ponts et Chaussées, Inspecteur Général de l'Hydraulique agricole, 148, boulevard du Montparnasse, Paris.
- 1387 SUQLET (Louis), Ingénieur en Chef des Ponts et Chaussées, 18, avenue Kléber, Paris (XVI°).
- 1363 TARTRAT (Paul), Ingénieur en Chef des Ponts et Chaussées, Ancien Directeur des Voies Navigables et des Ports Maritimes au Ministère des Travaux Publics, 51, rue de Prony, Paris (XVII°).
- 1434 TERRISSE (Henri), Ingénieur des Ponts et Chaussées, Détaché au S. S. E. de l'Aéronautique, 69, avenue de Ségur, Paris (VII°).
- 1850 THIÉBAUD (Jean-B.-F.), Agent Voyer d'Arrondissement honoraire, rue du Pont-de-la-Ville, Les Herbiers (Vendée).
- \*1628 THIERY (M.), Ingénieur en Chef des Ponts et Chaussées, 4, place de la République, Strasbourg (Bas-Rhin).
- \*1369 THIOILLIÈRE (Antoine), Ingénieur en Chef des Ponts et Chaussées, Saint-Etienne (Loire).
- 1089 THOMAS (François), Agent Voyer d'Arrondissement, 7 bis, rue Stappaert, Lille (Nord).
- 1489 THUILLIER (Joseph), Ingénieur des Ponts et Chaussées, 3, avenue Victor-Hugo, Dijon (Côte-d'Or).
- 1227 TRAVERSINI (E.), Industriel, 175, boulevard Malesherbes, Paris (XVII°).

## MM. Messrs. Sres.

- 1496 TRÉHARD (Henri), Ingénieur des Travaux Publics de l'Etat, Ingénieur-Inspecteur Principal du Contrôle des Tramways de la Seine et du Métropolitain, 19, rue Carpeaux, Courbevoie (Seine).
- 1289 TRUNEL (F.), Entrepreneur de Travaux Publics, Montpezat (Ardèche).
- 1228 TUR (Paul), Inspecteur Général des Ponts et Chaussées, Président de la 1<sup>re</sup> Section du Conseil Général des Ponts et Chaussées, 5 bis, impasse du Maine, Paris (XV<sup>e</sup>).
- 1272 USUREAU (P.), Entrepreneur de Cylindrages à vapeur, 53 bis, rue du Bellay, Angers (Maine-et-Loire).
- 1802 VALBUSA (Carlo), Ingénieur, Université de Rome, Directeur de la Société Moderne d'Entreprises, 45, rue des Acacias, Paris.
- 1214 VALLÉE (Georges), Inventeur du Tampon G. V., contre les effets destructeurs de la poussée du pavé de bois, 5, rue Saint-Ambroise, Paris (XI<sup>e</sup>).
- \*1025 VALLON (Omer), Administrateur de la C<sup>ie</sup> des Chemins de Fer du Nord, Maire de Chantilly, Hôtel-de-Ville, Chantilly (Oise).
- 1418 VARVIER, Ingénieur en Chef des Ponts et Chaussées, 9, rue Grolée, Lyon (Rhône).
- 1252 VASSEUR (Louis), Ingénieur en Chef des Ponts et Chaussées, 105, rue de Bayeux, Caen (Calvados).
- 1458 VATON (E.), Ingénieur E. C. P. I., 5, rue Weber, Paris (XVI<sup>e</sup>).
- 1448 VAURS (Albert), Agent Voyer en Chef, Clermont-Ferrand (Puy-de-Dôme).
- 1334 VERGER (Casimir), Ingénieur des Travaux Publics de l'Etat, 4, cours Marigny, Vincennes (Seine).
- 1244 VERRIÈRE (H.), Ingénieur en Chef des Ponts et Chaussées, 15, place du Champ-de-Foire, Vannes (Morbihan).
- \*1483 VERSILLÉ (J.), Entrepreneur de Travaux Publics, 4, chaussée de la Muefte, Paris (XVI<sup>e</sup>).
- \*1484 VERSILLÉ (Pierre), Entrepreneur de Travaux Publics, 30, rue Michel-Ange, Paris (XVI<sup>e</sup>).

MM. Messrs. Sres.

- \*1077 VITURAT (Claude), Entrepreneur de Travaux Publics, Pavages, Asphaltes et Bitumes, 50, rue de Javel, Paris (XV<sup>e</sup>).
- 1385 VOLONTAT (R. de), Inspecteur Général des Ponts et Chaussées, 67, rue de l'Université, Paris (VII<sup>e</sup>).
- 1400 WAHL (Paul), Ingénieur des Ponts et Chaussées, Meaux (Seine-et-Marne).
- 1417 WATELET (G.), Entrepreneur de Travaux Publics, 28, rue Merlin-de-Thionville, Suresnes (Seine).
- 1538 WATERKEYN, Ingénieur Civil, 11 bis, rue Angélique-Vérien, Neuilly-sur-Seine.
- \*1611 WATIER, Ingénieur en Chef des Ponts et Chaussées, Directeur des Voies navigables et des Ports maritimes au Ministère des Travaux publics, 244, boulevard St-Germain, Paris.
- 1935 F. WATTEbled, Ingénieur céramiste. 12, Rue Jose-Maria-de-Ileredia, Paris (VII<sup>e</sup>).

**Grande-Bretagne — Great Britain — Gran Bretaña**

- 1130 ADAM (Robert), Consulting Engineer, M. Inst. C. E., M. Am. Soc. C. E., 3, Anglesea, St Leonards-on-Sea.
- \*1896 AVELING (Major T.), M. C., Engineer, Director of the firm, Aveling and Porter Ltd, Rochester.
- 1764 BALLANTINE (W.), Laurieston, Falkirk.
- 1886 BARFORD (J. G.), Messrs Barford & Perkins Ltd, Peterborough.
- 1057 BAXTER (George), City Engineer, M. I. C. E., Consulting Engineer, Water-Commissioners, Dundee (Scotland).
- \*1925 BEADLE (Herbert E.), Road Maker, 12, Cannon Row, Westminster, London S. W. 1.
- 1308 BERRYMAN (Fred H.), Field House, Shepton Mallet (Somerset).
- 1747 BLAKEMORE (H. G. Granville), Engineer, 14-16, Grosvenor Gardens, London S. W. 1.
- 1864 BRASSEY (Edwards), Ministry of Transport, 7, Whitehall Gardens, London S. W. 1.
- \*1036 BRISTOW (F. G.), General Secretary, Commercial Motor Users Association, 50, Pall Mall, London S. W.

## MM. Messrs. Sres.

- 1765 BROOKES (A. E.), O. B. E., M. Inst. C. E., County Surveyor, Shire Hall, Durham.
- 1798 BULL (E. M.), Ministry of Transport, 7, Whitehall Gardens London, S. W.
- \*1529 BUTLER (John Fawkner), A. M. I. C. E., 1, Dickinson Street, Manchester.
- 1783 CHALMERS (K. E.), Blackbrook, Bickley (Kent).
- 1800 CHAPMAN (William-A.), County Road Surveyor, Airdrie (Scotland).
- 1784 CHAPMAN (H. T.), M. Inst. C. E., County Surveyor, St-Peter Street, Maidstone (Kent).
- \*1062 CLARKE (George E.), M. Inst. C. E., Mech. Eng., Borough Engineer and Surveyor, Borough Surveyor's Office, Municipal Buildings, Boston (Lincolnsh).
- 1847 COCKERTON (A. E.), County Surveyor, Oxfordshire C. Council, 8, New Road, Oxford.
- 1874 COMFORT (J. S. G.), 202, Winchester House, London E. C. 2.
- 1821 COOKE (Stenson), Secretary Automobile Association and Motor Union, Fanum House, Whitcomb Street, London W. C. 2.
- 1769 CROWTER (G. E.), Surveyor, Council Offices, Oxded (Surrey).
- 1781 CROXFORD (C. H.), Wood Urban Dis. Council, Town Hall, Wood Green N 22.
- 1782 CUMMING (W.), Highway Surveyor, Lanchester Rural Dis. Council, Lanchester (Durham).
- 1078 DARBISHIRE (Charles H.), Civil Engineer, Granite Quarries of Plasmawr, Penmaenmawr (North Wales).
- 1766 DENHAM (H. E.), The Dussek Bitumen Co, Sherman Street, Bromley-by-Bow, London E.
- 1875 DONALDSON (G.), County Road surveyor, Hunter Street, Kirkcaldy.
- 1188 DRUMMOND (Sir Robert), Surveyor, Surveyor's Office, High Street, Paisley, Renfrewshire (Scotland).
- \*1806 DURHAM (Frank R.), O. B. E., M. C., A. M. Inst. C. E. Director of Works, Imperial War Graves Commission, 28. Cumberland Road, Kew (Surrey).

MM. Messrs. Sres.

- 1770 DYER (R. H.), M. Inst. C. E., Borough Surveyor, Surveyor's office, Southend-on-Sea.
- 1845 FAIRFAX LUCY (Sir Henry, Bart.), Charlecote Park, near Warwick.
- 1891 FLEMING (W. G.), 31, Robertson Street, Glasgow.
- 1797 FREIR (W.), Electric Railway and Tramway Journal, 37/38 Strand, London W. C.
- 1059 GAY (Frederic Elie), Deputy City Surveyor and Engineer, 8, Clarendon Villas, Widcombe Hill, Bath.
- 1860 GETTINGS (F.), M. Inst. C. E., County Surveyor, Worcestershire County Council, 30, Foregate, Worcester.
- 1772 GIBBS (A. R.), A. M. I. C. E., Holly Bank, 103, Tierney Road, London S. W. 2.
- 1877 GIBSON (W. K.), Surveyor, Stranroer.
- 1774 GODSELL (J. S. P.), Ministry of Transport, 7, Whitehall Gardens, London S. W. 1.
- \*1286 GRACE (Henry Jinks), Managing Director Enderby and Stoney Stanton Granite Co Ltd, Enderby, near Leicester.
- 1773 GRAY (Chas. C.), 5, Drumshengh Gardens, Edinburgh (Scotland).
- 1806 HARRIS (Lt Col. F.), Engineer and Surveyor, Tunbridge Rural Dis. Council, Southborough, Tunbridge Wells (Kent).
- 1071 HARRISON (Arthur), M. Inst. C. E., Borough Engineer and Surveyor, Southwark, Town Hall, Walworth Road, London S. E. 17.
- 1767 HAWKINS (J. T.), Lieut. Col., M. Inst. C. E., County Surveyor, Shire Hall, Reading (Berks).
- 1866 HINES (J.), Roads Colloidal, Ltd., Trafalgar Buildings, London, S. W. 1.
- 1639 HOOGHWINKEL (G.), Ingénieur Civil, Ingénieur des Mines, Membre de l'Institut Britannique des Mines et de la Métallurgie, 161, rue du Faubourg-St-Honoré, Paris (8°).
- 1868 HUGH-MILLER « Roads and Road Construction », 83-85, Farringdon Street, London, E. C. 4.
- \*1758 HUMPHREYS (George William), C. B. E., M. Inst. C. E., 104, Drayton Gardens, South Kensington, London, S. W. 10.

MM. Messrs. Sres.

- 1762 JOHNSTON (J. T. M.), 79, Mark Lane, London E. C. 3.
- \*1207 JULIAN JULIAN (B. E.), Borough Surveyor, Guildhall, Cambridge.
- 1871 KILLICK (J. S.), M. Inst. C. E., Mrs, Shell Mer Ltd, Shell Corner Kingsway, London W. C. 2.
- 1299 LANGFORD (W. M.), General Manager of Penlee and St-Yves Stone Quarries Limited, 67, Queen Square, Bristol.
- 1839 LARRANAGA (P. J. M.), Consulting Highway Engineer, 104, Victoria Street, London S. W. 1.
- 1503 LOVEDAY (William F.), Captain R. E., Borough Surveyor, Town Hall, Milton Road, Stoke Newington London N 16.
- 1846 LYDDON (A. J.), O. B. E., Ministry of Transport, Quebec Annexe, 2, Park Place, Ledds.
- \*1914 MAC DONALD (Sir M.), K. C. M. G., C. B., M. I. C. E., Consulting Engineer, 72, Victoria Street, London S. W. 1.
- \*1917 MAC GRÉGOR Roos (W.), M. Inst. C. E., Woden Cottage, Kenley (Surrey).
- 1733 MAC WHIRTER (Charles), Vice-Chairman, Automobile Association and Motor Union, Fanum House, Whitcomb Street, London W. C. 2.
- 1835 MARTEN (Hubert B.), Stangate House, Westminster Bridge Rd. London S. E.
- 1836 MARTEN (Humphrey), Stangate House, Westminster Bridge Rd. London, S. E.
- 1779 MAWBAY (E. George), M. Inst. C. E. City Engineer, Town Hall, Leicester.
- \*1443 MEILANDT (H. S.), Road Engineer, Colonial Civil Service, Royal Colonial Institute, Northumberland Avenue, London W. C.
- 1763 MOULDING (T.), Municipal Offices, Exeter.
- 1530 MUIRHEAD (William), 41, Parliament Street, Westminster, London S. W. 1.
- \*1717 PEPLER (George Lionel), Chief Town Planning, Inspector, Ministry of Health, Whitehall, London S. W. 1.
- 1867 PERKINS BULL (W.), « Roads Colloidal Ltd. », Trafalgar Buildings, London S. W. 1.



## MM. Messrs. Sres.

- 1777 PERRIN (Eustace S.), Ministry of Transport, 7, Whitehall Gardens, London S. W. 1.
- 1844 PHILLIPS (G. A.), M. Inst. C. E., County Surveyor Glamorgan County Council, County Hall, Cardiff.
- 1795 PICKER (E.), Engineer and Surveyor, Beverley District Council, 12, Newbegin, Beverley, E. Yorks.
- 1873 PREVITE (Col. Ed. J.), 292, Winchester House, London E. C. 2.
- 1872 PREVITE (H. F., 292, Winchester House, London E. C. 2.
- 1093 RICHE (Wallace E.), General Secretary Roads Improvement Association Incorporated, 15, Dartmouth Street, Westminster, London S. W. 1.
- \*1011 ROTHSCHILD (The Right Hon. Lionel N. de), M. P. 46, Park Street, Londres W.
- 1865 SCOTT MONCRIEFFE (G. K.), Roads Colloidal Ltd., Trafalgar Buildings, London S. W. 1.
- \*1757 SHEPHERD (Ernest), c/o Messrs William Shepherd and Sons, Limited, Milkstone, Rochdale.
- 1853 SMITH (J. C. B.), Yorkshire Road Tar Binders Ltd, 26, Park Place, Leeds.
- 1794 SMITH (F. Everard), Canada House, Baldwin Street, Bristol.
- 1746 SMITH (Robert J.), Secretary of The Royal Scottish Automobile-Club, 163, West George Street, Glasgow.
- 1748 SMITH (William Boulton), Borough Engineer, Maison Dieu House, Dover.
- 1305 SPITTAL (Robert), County Road Surveyor of Lanarkshire, Middle Ward, District Offices, Hamilton.
- 1771 STALEY (F. G.), 14, Thornbury Avenue, Osterley Park, Isleworth (Mddx).
- 1750 SYMON (George), Surveyor, Council Offices, Blaydon-on-Tyne.
- 1887 TRUE (R.), Messrs. Barford and Perkins Ltd, Peterborough.
- 1778 TUDSBERY (H. T.), M. Inst. C. E., Ministry of Transport, 7, Whitehall Gardens, London S. W. 1.
- 1796 TURNER (F. G.), 19, Crescent Road, Wimbeldon, S. W. 20.

MM. Messrs. Sres.

- \*1855 WADESON (R. E.), Engineer, 51, Tothill Street, London S. W. 1.
- 1768 WALKER (W.), Council Offices, Calverley, Leeds.
- 1092 WATSON (James), Road Surveyor, Kirk Street, Strathaven (Ecosse).
- 1551 WESTON (David), Manager, The Walker-Weston Co Limited, Empire-House, 7, Wormwood Street, London E. C. 2.
- 1780 WETTERN (Herbert), St-Stephen House, Victoria Embankment, London S. W. 1.
- 1892 WHITAKER (B.), 2, Belveder Road, Scarborough.
- 1749 WHYATT (H. G.), Borough Engineer, 170, Victoria Street, Grimsby.
- 1704 WILLIAMS (B. V.), Late Assistant Controller timber supplies, 43, Borough High Street, London Bridge S. E. 1.
- \*1009 WOOD (Francis), M. Inst. C. E., F. C. S., Borough Engineer, Blackpool.
- 1852 WRIGHT (J. A.), Surveyor, Council Offices, Coronation Road, Covent Crosby.

Grèce — Greece — Grecia

- \*1097 LEZINAS (G.), Ingénieur, Architecte, 28, rue Melsovou, Athènes.
- 1507 PEZANOS (S. E.), Ingénieur, 7, rue Milliade, Athènes.
- 1362 ZACHARIOU (A.), Ingénieur du Service des T. P. de Grèce, 11, rue Zannis, Le Pirée.

Inde Anglaise — British India — India Inglesa

- 1920 ATKINS (M. R.), B. S. C., M. Inst. C. E., Chief Engineer, The Calcutta Improvement Trust, 5 Clive Street, Calcutta.
- \*1809 HUGHES (Henry), Assoc. M. Inst. C. E., Executive Engineer Public Works Department, Secrétariat, Rangoon, Burma.
- \*1407 STEWART (J. A.), Deputy Chief Engineer. Calcutta Improvement Trust, 5, Clive Street, Calcutta.

**Indes Néerlandaises — Netherland India — Indias Holandesas**

MM. Messrs. Sres.

- \*1900 CRAMER (H.), Ingénieur en Chef des Ponts et Chaussées au Département des T. P., D<sup>t</sup> B. O. W., Weltevreden.
- \*1557 HAARMAN (W. C. D.), Consulting Highway Engineer and Assistant Professor of Highway Engineering of the University of Bandoeng Riouwstraat 27, Bandoeng, Java.

**Indo-Chine française — Indo China**

- 1338 CONTE (Leandre), Directeur de la Société des Grands Travaux d'Extrême-Orient, Haiphong.
- \*1504 LEMAI (Louis), Ingénieur des Ponts et Chaussées, Hanoi (Tonkin).

**Irlande — Ireland — Irlanda**

- 1048 GULLAN (Hector E.), M. Inst. C. E., Asst. City Engineer, City Hall, Belfast.
- 1870 POLLOCK (A. L.), Assistant County Surveyor, Londonderry County Council, Limavady (C<sup>o</sup> Londonderry).
- \*1785 RATTERY (P. J.), B. E., M. Inst. C. E. I., Engineering Inspector, Ministry of local Government, Government Buildings, Dublin.

**Italie — Italy — Italia**

- 1808 ALBERTINI (Ing. Comm. Cesare), Capo della Divisione Edilizia nell' Ufficio tecnico municipale, Via Boccaccio 25, Milano 17.
- 1269 ANNONI (Erminio), Ingegnere, 23, Via L. Mascheroni, Milan.
- 1837 BORGESÀ (Grand' Uffice Ing<sup>ro</sup> E.), Presidente della Deputazione Provinciale di Torino, Commissario del Governo per le Abitazioni Avigliana, Provincia di Torino.
- 1329 CATTANEO (Paolo), Direttore Servizi tecnici Stradali, Municipio, Milano.
- 1803 CHIAPPA (Camillo), Ingegnere Capo del Ufficio Tecnico Provinciale, Stradone Farnese, 52, Piacenza.

## MM. Messrs. Sres.

- 1801 CONTE (Ugo), Cav. Ingénieur, Sous-Chef du Service de la Voirie, Via Due Macelli, 102, Rome (7).
- 1707 DIRECTEUR de la Société « Soliditit », 5, Via Toscana, Rome.
- 1318 FROSALI (Luigi), Ingegnere Capo de la Provincia di Firenze, Palais Riccardi, Florence.
- 1251 GOLA (Emilio), Cav. Ingegnere, 11, Viale di P. Monforte, Milano (20).
- 1792 GRULIS (Cav. Ing. Edoardo), Direttore del Ufficio tecnico comunale, Via Gabriele d'Annunzio, 5, Trieste.
- 1895 ISACCO (M. C.), Direttore Generale per le opere pubbliche Italia centrale, Ministero dei Lavori pubblici, Roma.
- 1120 MINORINI (Francesco), Ingénieur, Chef des Services Industriels de la Municipalité de Milan, 6, Via Aurelio Saffi, Milan.
- 1314 MUGGIA (Rag. Giuseppe), Empresa Lavori Pubblici, Parma.
- 1879 PELLIZZI (Giuseppe), Capo dell' Ufficio Tecnico dell' amm. prov. Reggio-Emilia.
- 1913 PERUGIA (A.), Administrator delegato della Soc. Italiana Pavimentazioni permanenti Bituminose Piazza Campo Marzio, 7, Roma.
- 1810 PINTO (Ing. Alfonso), Ingegnere presso l'Ufficio tecnico, provinciale, Solita Tarsia, 30, Napoli.
- 1849 IL PRESIDENTE DELLA DEPUTAZIONE PROVINCIALE DI MILANO.
- 1348 PUGNO (François), Ingénieur, 6, Viale di Porta Monforte, Milano.
- \*1401 PURICELLI (Piero), Ingénieur Comm. Consigliere Delegato della Società anonyma Puricelli Strade e Cave, Via Monforte, 44, Milano.
- 1878 REVERE (Giulio), Ingegnere, 4, Piazza Cavour, Milano.
- 1791 RIMONDINI (Pietro), Ingénieur Provincial, Ufficio tecnico Provinciale, Lugo (Ravenna).
- 1800 SETTIMI (Massimo), Comm. Ing. Ingegnere Capo Servizio Strade Ufficio tecnico Comunale, Piazza S. Eustachio, 83, Roma.
- 1863 STORNELLIO (Antonio), Ingénieur, Eboli, Province de Salerne.

## MM. Messrs. Sres.

- 1304 TEDESCHI (Massimo), Ingegnere, Commendatore C. I.,  
Via Filangeri, 8, Torino.
- 1095 TORTORA (Giuseppe), Ingegnere Capo Ufficio tecnico pro-  
vinciale di Napoli, Palazzo Prefettura, Naples.
- 1151 UCCELLI (Giovanni), Ingegnere Capo del Comune di  
Parma, Via Pietro Giordani, 4, Parma.
- 1856 VANDONE (Italo), Ingegnere, Direttore dell' Istituto Speri-  
mentale Stradale del Touring Club Italiano, 10, Corso  
Italia, Milano, 5.
- 1566 ZONTINI (Ezzelino), Entrepreneur de Travaux Publics,  
Villa Flora, Riva Sul Garda.

## Japon — Japan

- \*1386 MAKI (Hikoshichi), Public Works Bureau of Department  
for Home Affairs, n° 147, 6, Chome Aoyama-Minami-  
cho, Tokio (Akasaka).
- \*1911 MONIWA (Chujiro), Doctor of Engineer, Bureau of Public  
works Home Dep<sup>t</sup> of Japanese Government, Tokio.
- \*1932 MORI (Toyokichi), Civil Engineer, Asphalt Department,  
Nihonsekiyu, Tokio.
- \*1536 SAGAMI (Nobuichi), Civil officer, c/o Naimusho, Tokyo.
- \*1910 SATO (G.), Civil Engineer, Bureau of Public Works,  
Home Affairs, Japanese Government, Tokyo.
- \*1492 TAKAKUWA (T.), Professor of Kiriu Technical College,  
Kiriu (Gummaken).
- \*1931 YAMAMOTO (Toru), Paving Engineer, Roads Department  
Tokio Municipal Office, Tokio.
- \*1933 YATSUI (Yonosuke), City Engineer, Roads Department  
City of Tokio, Tokio.

## Luxembourg — Luxembourg — Luxemburgo

- 1128 BIERMANN (Guillaume), Conducteur des Travaux Publics,  
86, rue de Luxembourg, Esch-sur-Alzette.
- 1775 CLOOS (Félix), rue Victor-Hugo, 39, Esch-sur-Alzette.
- 1106 FONCK (Victor), Conducteur des Travaux Publics, 9, rue  
des Roses, Luxembourg.

MM. Messrs. Sres.

- 1105 HANSEN (Lucien), Conducteur des Travaux Publics, rue Chimay, Luxembourg.  
 \*1024 KLENSCH (Jules), Ingénieur Civil, Entrepreneur de Travaux Publics, 52, rue des Carmélites, Luxembourg.

### Madagascar

- 1192 JAQUET (C. A.), Ingénieur des Travaux Publics des Colonies, Chef du Service de la Construction du Chemin de fer, Antsirabe.

### Maroc — Morocco — Maruecos

- 1359 DELPIT, Directeur des Travaux Publics du Maroc, Rabat.  
 1449 FERRAS (V.), Ingénieur en Chef des Ponts et Chaussées, Résidence générale, Rabat.  
 1923 JOSSERAND (Jules), Directeur de la Société d'Entreprises G. Brun, rue des Ouled-Tiane, Casablanca.  
 \*1012 SANS SOLER (José), Inspector General de Caminos, Canales y Puertos, Chemin de fer de Tanger à Fez. Tanger.

### Mexique — Mexico — Mejico

- 1323 AVILEZ (Ignacio), Ingénieur Civil, Professeur à l'Ecole Nationale des Ingénieurs, 105, Estanco de Mujeres, Mexico D. F.  
 1812 MARTINEZ (J. A.), Civil Engineer, El Oro Mining & Ry Co L<sup>td</sup>, El Oro.

### Monaco

- 1687 BRIGUIBOUL (Madame), Villa Ste-Cécile, Monte-Carlo.  
 1068 CHAUVET (R.), Ingénieur des Ponts et Chaussées, quai du Port, Monaco.  
 1452 FAU (Gabriel), Hôtelier, Hôtel Windsor, Monte-Carlo.  
 1453 FONTANA (Michel), Entrepreneur de Travaux Publics, Villa Rello, rue des Aganes, Monaco.  
 1451 GAILLARD (Antoine), Hôtelier, Hôtel Windsor, Monte-Carlo.

### Nouvelle-Zélande — New Zealand — Nueva Zelanda

- 1501 MACE (T. G.), 1, Majoribank Street, Wellington.

**Pays-Bas — Netherlands — Paises-Bajos**

MM. Messrs. Sres.

- 1263 BAETEN (Henri), Industriel, 11, rue Neuve, Maestricht.
- \*1883 BERG (W. Van den), Directeur de la Société anonyme Utrechtsche Asphaltfabrick, Omval, Amsterdam.
- 1142 BOESEWINKEL (H.), Entrepreneur, Zutphen.
- \*1478 BONGAERTS (M.-C.), Ingénieur en Chef des Ponts et Chaussées, Juliana Van Stelberglaan, La Haye.
- \*1888 Bos (Adrien), Entrepreneur, 17, Nieuvehaven, Dordrecht.
- \*1889 Bos (Pierre), Ingénieur, 17, Nieuvehaven, Dordrecht.
- 1840 BROCK (G. J. Van den), Ingénieur en Chef du Waterstaat, Leidsche Straat, 82-84, Amsterdam.
- 1301 BURG (P. Van den), " Basalt Maalschappy ", Gelderschestraat, 12, Rotterdam.
- 1686 DUMONT (L.-C.), Directeur des Travaux Publics, Prinsenhof n° 1, Haarlem.
- 1159 GELINCK (W. G. C.), Hoofdingénieur, Directeur van den Rijkswaterstaat, Wilhelminastraat, n° 48, Haarlem.
- 1298 GROOT (V. de), Directeur du Service du Nettoiement et de la Voirie, Bronwersgracht 2, La Haye.
- 1659 GROOT (Ir. N. J. de), Ingénieur des Ponts et Chaussées, des Indes Néerlandaises, Sweelinckstraat, 88, La Haye.
- 1790 HARMS (J. Henry), Engineer-Manager, Engineering-Department, c/o Continental Petroleum Company, Willem Buytewechstraat, 7°, Rotterdam.
- 1070 HENDRICKS (C. J. P. P.), Welhonder von Ossenbare Werker, Woerden.
- 1756 HENDRIX (J.-N.), Député permanent des Etats provinciaux, Gouvernement Jansstraat, Haarlem.
- 1155 HEYST (Van), Ingénieur en Chef van den Waterstaat, Bezuidenhout, 121, La Haye.
- \*1268 JANSON (Johannes H.), Directeur du Bureau Central de l'Association des Fabricants de Gaz aux Pays-Bas, 164, van Beverningkstraat, La Haye.
- \*1143 KERKHOF (Bernard Johan), Directeur de la Soc. an. Stoomwalsenbedrijf, Deventerweg, 61, Zutphen.
- 1233 KONIG (A. A. H. W.), Minister van Waterstaat, La Haye.

MM. Messrs. Sres.

- 1205 OPPEN (L. B. J. Van), Docteur en Droit. Bourgmestre de Maëstricht, Hôtel-de-Ville, Maëstricht.
- 1279 PETERS (A. A. G.), Représentant de la " Basalt Maatschappij ", 12, Gelderschestraat, Rotterdam.
- 1408 POS (G. A.), Verzonden door den 2<sup>en</sup> Voorzitter-Hoofdcousul, Keizersgracht, 590, Amsterdam.
- 1085 SANDBERG (F. E. P.), Ingénieur en Chef du Waterstaat, " Hoog Wolde " Spvorweglaan 4, Baarn.
- 1297 SCHARP (J.-C.), Ingénieur en Chef du Waterstaat, Westerveg, 103, Aekmaar.
- 1231 SCHLINGEMANN (F. L.), Ingénieur van den Rijkswaterstaat, Roermont.
- 1083 Secrétaire du Comité des Routes de l'A. N. W. B., Touring Club des Pays-Bas, Parkstraat, 18, La Haye.
- 1859 SMITS (J. J. L.), Directeur Van Het Electriciteits en Frambedrijf, Willem de Zwijgerstraat, Utrecht.
- \*1327 STEFFELAAR (L. C.), Président du Comité des Routes de l'A. N. W. B., Membre du Conseil d'Administration de l'A. N. W. B., Touring-Club des Pays-Bas, Van Beuningstraat, 7, La Haye.
- \*1325 STEVENS (Raymond), Directeur de l'Usine de créosotage des bois, Groote-Wittenburgerstaat, 110, Amsterdam.
- 1351 THIERRY (J.-W.), Ingénieur des Travaux du Zuyderzée, Nachtegaallaan, 107, La Haye.
- 1065 THOORN (N. A. M. Van den), Ingénieur en Chef, Directeur du Waterstaat en retraite, Amalia van Solmsstraat, 80, La Haye.
- \*1684 VLISSINGEN (Van J.-P.), Ingénieur en Chef, Directeur du Waterstaat Leeuwarden.
- \*1683 VOORST VADER (P. J. Van), Ingénieur van den Rijkswaterstaat, Florapark 13, Haarlem.
- 1313 WENTHOLT (D' L. R.), Ingénieur van den Rijkswaterstaat, . Pater Brugmanstraat, 8, Nijmegen.

Pérou — Peru — Perú

- \*1464 SPALDING (W. J.), Civil Engineer, Apartado, 1330, Lima.



**Pologne — Poland — Polonia**

MM. Messrs. Sres.

- 1929 BAJKIEWICZ (Jerzy), Inzinier du district de Varsovie, rue Długa, 15, Starostwo II, pietro, Varsovie.
- 1776 BRYLA (Stefan Wladyslaw), Ingénieur, Docteur ès Sciences techniques, Professeur à l'Ecole Polytechnique, Ulica Lwowska, 9, Varsovie.
- 1210 KOWALSKI (J.), Ingénieur, Inspecteur des Routes au Ministère des Travaux Publics, Varsovie.
- 1760 KUEHNEL (Arthur), Ingénieur, Professeur à l'Ecole Polytechnique, Lwow.
- 1685 MINCHEJMER (Richard), Ingénieur, Inspecteur des Routes au Ministère des Travaux Publics, Varsovie.
- 1209 NESTOROWICZ (M.), Ingénieur, Directeur du Service de la Voirie Routière au Ministère des Travaux Publics, Membre de la C. I. P. des Congrès de la Route, rue Kredytowa, Varsovie.
- 1709 PRZYBYLSKI (A.), Entrepreneur de Construction de Routes et de Ponts, 22, rue Marszalkowska, Varsovie.
- 1708 STROZECKI (Michiel), Ingénieur, Chef du Bureau de Construction des Ponts au Ministère des Travaux Publics, Varsovie.

**Portugal**

- 1558 CARRAL (A.-B.), Ingénieur des Ponts et Chaussées, Chef du Service des Routes du district de Santarem, Santarem.
- \*1534 COSTA NOVAES (Da), Engenheiro civil, Rua D. Estefania 179 — 1<sup>o</sup>, Lisbonne.
- 1752 GALVÃO (Joao Lino de Sousa), Engenheiro civil, Ingénieur en Chef du Département des Routes, au Ministère du Commerce et Communications, Lisbonne.
- 1712 MELO GERALDES (J. M. de), Ingénieur, Director das Obras publicas, Castelo-Branco.
- 1711 MONTEIRO (Eduardo d'Azevedo), Engenheiro civil, Leiria.
- 1063 RIBEIRO DE ALMEIDA (J.), Ingénieur en Chef des Travaux Publics, Ingénieur Civil des Mines, Secrétaire de la Commission des Ponts, Avenida Defensores de Chaves, 79-2<sup>o</sup> Lisbonne.

## MM. Messrs. Sres.

- 1154 ROLDAN (Manuel), Ingénieur, Directeur Général des Mines et Services géologiques, Campo dos Martires da Patria, 86, 2° D., Lisbonne.
- 1786 SIMOES (Alvaro da Silva), Engenheiro, Chef de Division des Routes de Portalègre, Portalègre.
- 1751 TAVEIRA DE CARVALHO (Antonio), Ingénieur Civil, Chef du Service des Routes du district de Porto, Rua d'Alegria, n° 200, Porto.
- 1703 ZUQUETE (A. V. d'Azevedo), Engenheiro, Chefe de divisao de estradas do districto de Leiria, Leiria.

## Roumanie — Roumania — Rumania

- 1152 CAPRIEL (Dicran), Ingénieur, rue Democratiei, 37, Galatz.
- 1509 CIOCALTAU (P.), Ingénieur, Inspecteur Général, Ministerul Lucrarilor Publice, Bucarest.
- 1129 COSTACHE (Constantin), Ingénieur, Inspecteur Général, Str. Vasile Lascar, 54, Bucarest.
- 1360 DENETRESCO (Jean), Ingénieur au Ministère des Travaux Publics, Bucarest.
- 1510 DIMO (P.), Ingénieur, Inspecteur Général, Ministerul Lucrarilor Publice, Bucarest.
- 1508 DUMITRESCO (A.), Directeur Général des Ponts et Chaussées, Ministerul Lucrarilor Publice, Bucarest.
- 1512 LUPESCO (A.), Ingénieur en Chef, Ministerul Lucrarilor Publice, Bucarest.
- 1511 MIHALACHE (J.), Ingénieur en Chef, Ministerul Lucrarilor Publice, Bucarest.
- 1539 SFINTZESCOU (Tibère), Ingénieur en Chef, Secrétaire Général du Ministère des Travaux Publics, 5, rue Temisana, Bucarest.
- \*1033 STAUCEANU (Victor), Ingénieur, 32, rue Brutar, Bucarest.
- 1343 VASILESCU KARPEN, Directeur de l'Ecole Polytechnique de Bucarest, 132, Calea Grivitzzei, Bucarest.

## Siam

- 1527 HOONTRAKOOL (J. H.), Secrétaire de la Légation royale de Siam, 8, rue Greuze, Paris (XVI<sup>e</sup>).

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1528 VATHANAHRIDA (Kimliang), Attaché à la Légation royale de Siam, 8, rue Greuze, Paris (XVI<sup>e</sup>).

**Suède — Sweden — Suecia .**

- \*1725 ADLER (Cap. Knut Ch.), Chef des Travaux Publics de la Ville de Linköping, Linköping.
- \*1706 ASPLUND (M. le Commandant A.), Chef de District de l'Administration des Ponts et Chaussées, Gothenbourg.
- 1607 BERGMAN (Carl Gustav), Ingénieur, Capitaine au Corps des Ponts et Chaussées, Riddarhustorget, 8, Stockholm.
- \*1559 BLIDBERG (Per Gustav), Lieutenant des Ponts et Chaussées, Byggnadskontoret, Gothenbourg.
- \*1744 BLOMBERG (J.-A.), Commandant, Chef de District de l'Administration des Ponts et Chaussées, Malmö.
- \*1661 BOLINDER (Cap. Nils L.), Premier Ingénieur à l'Administration des Ponts et Chaussées, St-Eriksplan, 6 B, Stockholm.
- 1689 DAHLBERG (Gustaf), Civilingenior, Hamngatan, 1 A, Stockholm.
- \*1793 EKELUND (John, Albert, Daniel), Lieutenant-Colonel, Chef de District de l'Administration des Ponts et Chaussées, Norrköping.
- \*1316 ENBLUM (Ofverstelöjtnant Fr.), t. f., Byrachef i Kungl. Väg-och Vattenbyggnadsstyrelsen, Bellmansgatan, 6, Stockholm.
- 1080 FERNSTROM (A. K.), Propriétaire de Carrières de Granite, Exportateur de Pavés, Bordures, etc., Carlshamn.
- 1903 GEUDT (Joseph), Ingénieur, Frejgatan 58, Stockholm.
- \*1681 GYLLENBERG (C. E.), Capitaine, Ingénieur à l'Administration des Ponts et Chaussées, Drottninggatan, 71 D., Stockholm.
- 1150 HEDSTROM (Erland), Ingénieur en Chef de la Voirie de la Ville de Stockholm, Karlsbergswagen, 8, Stockholm.
- \*1660 INSULANDER (Carl Johan), Commandant, Chef de District de l'Administration des Ponts et Chaussées, Stockholm.
- 1107 KULLGRENS ENKA (C. A.), Granitaktiebolaget, Uddevalla.

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- \*1922 LENNART VON HEIJM, Capitaine au Corps du Génie Prästgalan 25, Östersund.
- \*1857 LILIENBERG (Albert), Chef du Bureau de l'aménagement de la Ville de Gothenbourg, Stadsingeniorshontovet, Göteborg.
- \*1710 LUNDSTROM (Comm<sup>t</sup> F. A.), Ingénieur de District de l'Administration des Ponts et Chaussées, Sundsvall.
- \*1662 MAGNUSON (Gustaf S.), Lieutenant, Ingénieur à l'Administration des Chemins de fer de l'État, Dalagatan, 78 A. Stockholm.
- \*1156 PALLIN (H.-N.), Ingénieur des Ponts et Chaussées, Capitaine de réserve du Génie Royal, Hovslagaregat, 1, Stockholm.
- 1307 PETERSSON (Ingelar), Commandant au Corps Royal des Ponts et Chaussées, Chef de la Commission du Djurgården, Sturegatan 38, 2 tr., Stockholm.
- \*1934 PLOMAN (Per Fredrik), Ingénieur de District de l'Administration des Ponts et Chaussées, Östercynd.
- 1533 SANDER (Oscar), Vägmaslare, Luleå.
- 1219 SJÖGREN (Kapten E. Axelsson), Malmö Stads byggnadschef, Malmö.
- 1904 THURESSON (T. V.), Ingénieur en Chef de la Ville de Helsingborg, Bragaliden 14, Helsingborg.
- \*1532 VALSINGER (P. A.), Ingénieur, 36 A, Karlbergswägen, Stockholm.
- \*1256 WRETJIND (E. Paul), Directeur de la Société anonyme " Vägforbättringar ", Blasieholmsgat, 3, Stockholm.

#### Suisse — Switzerland — Suiza

- \*1743 ALTWEGG (Arnold), Ingénieur Cantonal, St-Gallen.
- 1187 AMMANN (U.), Constructeur, Langenthal.
- 1738 ANDREAE (Charles), Professeur à l'Ecole Polytechnique, Burglistrasse 30, Zurich.
- 1351 ARCHINARD (Louis), Ingénieur de la Ville de Genève, Hôtel Municipal, Genève.
- 1099 COSANDEY (William), Ingénieur en Chef au Département des Travaux Publics, Lausanne.

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- \*1037 CROUSAZ (Roger de), Ingénieur, Administrateur de la Société Suisse de Construction de Routes S. A., 22, rue du Petit-Chêne, Lausanne.
- 1232 DELUZ (Louis), Ingénieur-Conseil, 26 avenue Mousquines, Lausanne.
- \*1040 DIESBACH (C. H. de), Ingénieur E. P. Z., Fribourg.
- \*1862 DUFOUR (A.), Inspecteur des Routes Départementales des Travaux Publics à Genève.
- 1070 EMERY (Alexandre), Ancien Conseiller National, Ancien Syndic de la Commune de Chatelard-Montreux, Villa Florentine, Montreux.
- 1166 GRIVAZ (H.), Chef de Service au Département des Travaux Publics, Lausanne.
- 1075 KUNTSCHE (Joseph), Conseiller d'Etat, Député au Conseil National, Sion (Valais).
- 1185 NITOBÉ (Inazo), Section des Bureaux Internationaux, Secrétariat de la Société des Nations, Genève.
- 1087 PFYTTER D'ALTISHOREN (Colonel H.), Commandant la 7<sup>e</sup> Brigade d'Infanterie, Villa Hans, Lucerne.
- \*1663 SPINEDI (Jean), Entrepreneur de Travaux Publics, rue Jean-Louis-Hugon, 6-8, Plainpalais-Genève.
- 1082 WENNER (V.), Hauptstrasse, 128, Vienne.

## Syrie — Syria — Siria

- 1761 HASSAN IZZET PACHA, Directeur des Travaux Publics de la Fédération Syrienne, Alep.

## Tchéco-Slovaquie — Czecho-Slovaquia — Checo-Eslovaquia

- 1589 ALBINI (F.), Ingénieur-Conseiller du Ministère des Travaux Publics, Ministère des Travaux Publics, Prague.
- 1555 DERKA (Josef), Conseiller de la Commission du Département, Zemsky dum I, Brno.
- 1552 DOSTAL (Gustav), Ingénieur, Directeur des Travaux Départementaux, Zemsky stavebni reditel, Zemsky dum II, Brno.
- 1567 DVOŘÁK (Eduard), Ingénieur, Turčanský, Sv. Martin, staveb, úrad.

## MM. Messrs. Sres.

- 1592 ENRENBERGER, Ingénieur, Conseiller supérieur, Opava.
- 1563 GENTTNER (V.), Ingénieur, Conseiller des Ponts et Chaussées du Pays de Bohême, Krkonosska 15, Prague Vinohrady.
- 1593 GRUND (Rodolphe), Conseiller Supérieur des Mines, Banska, Bystrice.
- 1352 HLOUSEK (A.), Membre de la C. I. P., Conseiller au Ministère des Travaux Publics, Libenska ulice, 453, Prague VII.
- 1562 KREJCI (Fr.), Ingénieur, Conseiller Supérieur des Ponts et Chaussées du Pays de Bohême, Prague III/6.
- 1578 KRIVANEC (Karel), Ingénieur de l'Etat Tchéco-Slovaque, Référat Verejnych prác, Bratislava.
- 1643 LENDL (A.), Ingénieur en Chef, Bratislava.
- 1553 MATEJ (Karel), Ingénieur, Conseiller de 1<sup>re</sup> classe de Construction Départementale, Zemsky vochni stavebni rada, Zemsky dum II, Brno.
- 1191 NEDVED (Joseph), Ingénieur en Chef au Ministère des Travaux Publics, Preslova, 6, Prague-Smichov.
- 1560 PULPAN (V.), Ingénieur, Directeur des Ponts et Chaussées, du Pays de Bohême, Prague III/6.
- 1634 REIF (François), Ingénieur du Service de l'Etat, Statny stavebny urad, Presov-Slovensko.
- 1554 SOTOLAR (Antonin), Membre de la Commission du Département, Zemsky dum II, Brno.
- 1591 SPACEK (Karel), Professeur du Cours de Routes à la Haute Ecole technique de Prague, Prague, II, 228.
- 1590 SVOBODA (J.), Ingénieur, Conseiller du Ministère des Travaux Publics, Ministère des Travaux Publics, Prague.
- 1594 SYROVATKA (Eugène), Ingénieur des Ponts et Chaussées, Conseiller Supérieur, Ministère des Travaux Publics, Preslova 6, Prague.
- 1564 TREUSCH-BUTTLAR (J.-U.), Docteur en Droit, Conseiller du Pays de Bohême, Prague IV-288.
- 1561 TROJAN (Jar.), Ingénieur, Conseiller des Ponts et Chaussées du Pays de Bohême, Prague-Smichov, 270.

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- 1498 VALINA (Karel), Ingénieur, Zemsky stravebni rada, Dobrovského ul. 6, Prague-Vinohrady.

**Tunisie — Tunis**

- \*1522 STOLL, Entrepreneur de cylindrages, Tunis.

**Uruguay**

- \*1136 ALVAREZ CORTES (Juan A.), Ingeniero, Doyen de la " Facultad de Ingeniera ", Mercedes, 1174, Montevideo.
- \*1190 CAPURRO (F. E.), Ingénieur des Ponts et Chaussées, Chef de la Direction des Ponts et Chaussées au Ministère des Travaux Publics, Professeur, Membre du Conseil Directif, Ex-doyen des Ecoles d'Ingénieurs, Calle treinta y tres 1204, Montevideo.
- \*1022 LLOBET (Andrés), Ingeniero, Assoc. M. I. C. E., Colonia, 310, Montevideo.
- \*1148 PONCE (Luis P.), Ingeniero de Puentes y Caminos, Professor de Puentes en la Facultad de Ingeniera, Miembro del Consejo Directivo de la misma, Calle 21 de Setiembre, 475 B, Montevideo.
- \*1147 PONCE (Florencio G.), Ingeniero de Puentes y Caminos, Jefe de Sección de la Dirección de Vialidad, Calle Canelones, 2072, Montevideo.
- \*1031 SMITH (Juan F.), Ingeniero Consultor, Palacio Golorons, 1143, Plaza Libertad, Montevideo.
- \*1027 STORM (Juan), Ingénieur, Entrepreneur de Travaux Publics, Calle 1° de Mayo, 1438, Montevideo.
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- 3149 CARLIER (Ferdinand), Ingénieur, Meir, 48, Anvers.
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- 3283 NETTLETON (O. T.), Délégué au Gouvernement de Ceylan, Parade, 120, Marine, Worthing.

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- 3139 CHRISTENSEN (Carl), Ingénieur, Cand. Polyt. M. I. F., Odensegade, 22, Copenhague O.
- 3014 JACOBSEN (N.), Arquitecto. Odense.
- 3016 JURGENSEN (Dettef), Directeur Automobile-Club Royal Danois, Palace Hohl, Copenhague.
- 3047 LEHRMANN (O.), Ingénieur, Livjoegergade, 44, Copenhague.
- 3077 RASMUSSEN (Nills), Ingénieur. Svanemollevej, 50, Copenhague.
- 3003 RYGNER (H. V.), Ingénieur, Odense.

#### Etats-Unis — United States — Estados Unidos

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**Espagne — Spain — España**

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- 3065 AGUILAR Y LOPEZ (Manuel), Ingeniero de Caminos, Canales y Puertos, Conde de Aranda 16, Madrid.
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- 3007 ARRATE Y ORMAZABAL (Juan de), Ingeniero de Caminos, Canales y Puertos, General Espartero, 7, Santander.
- 3347 ASIN (Alberto), Agregado Comercial à la Legación del Perú en España, Madrid.

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- 3160 BARBER SANCHEZ (Luis), Ingeniero de Caminos, Canales y Puertos, Jefatura de Obras Públicas, Toledo.
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- 3126 BASABE GONZALEZ (Vicente), Ingeniero de Caminos, Canales y Puertos, Ambrosio de Morales, 9, Cordoba.
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- 3321 BEARDO (Manuel), Industrial, Albareda, 27, Sevilla.
- 3218 BENAVIDES PALZ (Francisco), Ingeniero de Caminos, Canales y Puertos, Los Madrazo, 3 y 5, Madrid.
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- 3147 BOGUERIN (Ricardo), Consejero de Obras Públicas, General Orán, 19, Madrid.
- 3272 BOJIN (Carlos), Estudiante de Ingeniero de Caminos, Escuela de Ingenieros de Caminos, Alfonso XII, 3, Madrid.
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- 3165 CABESTANY (José), Ingeniero, Director general de los servicios técnicos de la ciudad, Barcelona.

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- 3260 CALDERÓN PÉREZ (César Mariano), Perito Mercantil, Vara del Rey, 13, pral. Murcia.
- 3329 CANDAU (Francisco), Ingeniero, Alvarez Quintero, 24-26, Sevilla.
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- 3245 CASADO GARCÍA (Lorenzo), Ingeniero de Montes, Jerónimo Hernández, 22, Sevilla.
- 3070 CASAMOR CALM (José), Ingeniero de Caminos, Canales y Puertos, Jefatura de Obras Públicas, Gerona.
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- 3035 DICENTA (Luis), Ingeniero Jefe de Caminos, Canales y Puertos, Jefatura de Obras Públicas, Colón 15, Valencia.
- 3224 DIEZ TORRE (Aurelio), Ingeniero de Minas, Plaza de las Monjas 1, Huelva.
- 3314 DONAT Y SANZ (Emilio), Ingeniero de Caminos, Diputación provincial de Valencia.
- 3301 DURÁN DEZA (Dámaso), Sobrestante de Obras Públicas, San Vicente, 97 A, Sevilla.
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- 3211 FERRER Y GRIERA (Félix), Ingeniero de Caminos, Canales y Puertos, Diputación 237, Barcelona.
- 3280 FRANCESCONI (Alfredo), Estudiante de Ingeniero de Caminos, Escuela de Ingenieros de Caminos, Alfonso XII, 3, Madrid.
- 3239 FRANQUELO CARRASCO (Eduardo), Ingeniero de Caminos, Canales y Puertos, Jefatura de Obras Públicas, Málaga.
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